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SLAMS / NAMS / PAMS NETWORK REVIEW GUIDANCE

EPA

SLAMS/NAMS/PAMS NETWORK REVIEW GUIDANCE

REVISED FINAL REPORT

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Statement

At the date of the finalization of this document (March 1998), revisions to the Ambient Air Quality Surveillance regulations as contained in CFR40 part 58 for the criteria pollutants sulfur dioxide (SO_2) and lead (Pb) were in the final process of being implemented. Promulgation of the revision to the Pb regulation is expected by June 1998 and the revised SO_2 regulation by December 1998. Please note, in order to be expedient in the preparation of this document, the proposed revisions to the guidance for Pb and SO_2 were incorporated into the content.

1.0 INTRODUCTION

The Code of Federal Regulations, Title 40, Part 58[1] (40 CFR Part 58) contains the U.S. Environmental Protection Agency's (EPA) ambient air quality surveillance regulations. Section 58.20 requires States to provide for the establishment of air quality surveillance systems in their State Implementation Plans (SIP). The air quality surveillance system consists of a network of monitoring stations designated as State and Local Air Monitoring Stations (SLAMS), which measure ambient concentrations of those pollutants for which standards have been established in 40 CFR Part 50. SLAMS, National Air Monitoring Stations (NAMS), which are a subset of SLAMS, and Photochemical Monitoring Stations (PAMS) must meet the requirements of 40 CFR Part 58, Appendices A (Quality Assurance Requirements), C (Ambient Air Quality Monitoring Methodology), D (Network Design Criteria), and E (Probe and Path Siting Criteria). Conformance with the requirements of Appendices A and C is determined in part through periodic systems audits and national performance audits which are required in Section 2.4 of Appendix A. Conformance with the requirements of Appendices D and E is determined during the annual review of the air quality surveillance system which States are required to provide for in 40 CFR 58.20(d). It is important to note that this guidance focuses on an annual review of ambient monitoring networks (that is, the number of monitoring stations, the types of stations, location of stations, and specific probe and open path siting criteria). Guidance on agencies' quality assurance programs is not intended as part of this network review guidance.

The annual network review is used to determine how well the network is achieving its required air monitoring objectives, how well it is meeting data users needs, and how it should be modified (*e.g.*, through termination of existing stations, relocation of stations, or establishment of new stations) to continue to meet its monitoring objectives and data needs. The main purpose of the review is to improve the network to ensure that it provides adequate, representative, and useful air quality data. Ambient air quality data from the network are used for a variety of purposes including making national ambient air quality standards (NAAQS) attainment/nonattainment designations; determining maximum concentration locations; determining the effectiveness of air pollution control programs; evaluating the effects of air pollution levels on public health; tracking the progress of SIPs;

providing dispersion modeling support; developing responsible, cost-effective control strategies; reconciling emission inventories; and developing air quality trends. In addition to these data uses or needs, the annual network review should consider the adequacy of the network in meeting additional performance objectives, including providing data for tracking State performance, measuring acidic deposition and species concentrations in rainfall, measuring visibility and related parameters, providing research information, and providing public information in general. These additional data needs are discussed in more detail in Section 2.3.

1.1 PURPOSE OF GUIDANCE DOCUMENT

Because 40 CFR Part 58 does not specify network review criteria, the nature of the network review has differed from Region to Region. The purpose of this network review guidance is to provide the Part 58 regulatory background and appropriate technical criteria which form the basis for the network review as well as to provide EPA's plans and strategies concerning non-regulatory data needs which should be considered during the conduct of the annual network review. This guidance is intended for Regional Office use in evaluating State and local agency networks, and it may also be useful to State and local agencies in preparing for a network review. This guidance represents a compilation of approaches currently practiced in the Regions. Its contents should not be viewed as a prescriptive requirement that must be followed in its entirety but rather as a framework for promoting national uniformity in the evaluation of State and local agency monitoring networks. EPA Regional Offices and State and local agencies may identify additional items that need to be addressed during the network review that will supplement this guidance and allow for dealing, on a case-by-case basis, with significant network deficiencies which are identified during the course of the network review. This guidance should be reviewed periodically to ensure that the policies and procedures remain current and appropriate, and revised whenever the network design and siting criteria are changed or more cost-effective and innovative procedures are developed.

1.2 ORGANIZATION

Section 2.0 of this guidance contains a summary of the regulatory requirements contained in Appendices D and E as well as a description of other ambient air monitoring data needs that should be considered during the network review. Section 3.0 provides an overview of network review procedures to determine conformance with Appendix D and E requirements. Section 4.0 contains an example checklist for conducting a network review. Section 5.0 includes a list of references.

2.0 REGULATORY REQUIREMENTS AND OTHER DATA NEEDS

2.1 APPENDIX D REQUIREMENTS

This section highlights the network design requirements and guidance included in Appendix D of Part 58.[2] Appendix D contains information on the concepts of ambient air monitoring network design for establishing the SLAMS, NAMS, and PAMS. It addresses monitoring objectives, criteria for selecting general locations for monitoring stations, and guidance on the number and location of NAMS, PAMS, and core stations for $PM_{2.5}$. The concepts and guidance contained in Appendix D as well as other non-regulatory EPA data needs should be considered in evaluating the adequacy of the SLAMS/NAMS/PAMS networks.

2.1.1 Monitoring Objectives and Spatial Scales

Appendix D of Part 58 calls for the SLAMS monitoring network to be designed to meet a minimum of six basic ambient air monitoring objectives. These six primary SLAMS objectives are as follows:

(1) to determine highest concentrations expected to occur in the area covered by the network;

(2) to determine representative concentrations in areas of high population density;

(3) to determine the impact on ambient pollution levels of significant sources or source categories;

(4) to determine general background concentration levels;

(5) to determine the extent of Regional pollutant transport among populated areas, and in support of secondary standards; and

(6) to determine the welfare-related impacts in more rural and remote areas (such as visibility impairment and effects on vegetation).

The goal in designing the SLAMS networks is to establish monitoring stations that will provide data to meet these monitoring objectives and as input to EPA and States to improve environmental decisions.

Appendix D also provides guidance concerning the concept of spatial scales of representativeness that individual stations in a SLAMS network should represent. Ideally, the SLAMS monitor should be located such that the air quality of the volume of sampled air be representative of the air quality over the entire area that the monitoring station is intended to represent. The typical spatial scales of representativeness associated with most ambient monitoring objectives are microscale, middle scale, neighborhood scale, urban scale, and regional scale. During the station selection process, the goal is to match the spatial scale represented by the sample of monitored air at a given location with the spatial scale most appropriate for the monitoring objective of that respective station.

Table 2-1 shows the relationship among monitoring objectives and scales of representativeness. Additional details are provided in Appendix D, Section 2, concerning the types of areas that specific spatial scales should characterize. For example, for SO_2 monitoring, a neighborhood scale station applies to areas where the SO_2 concentrations gradient is relatively flat (mainly suburban areas surrounding the urban center or in large sections of small cities and towns.) Such areas are homogeneous in terms of SO_2 emission rates and population density. Similar examples are provided for the other criteria pollutants. In addition, references to EPA guidance documents to assist in designing and siting monitoring stations for specific pollutants are provided in Appendix D.[3] Table 2-2 shows a summary of spatial scales applicable for SLAMS and required for NAMS for each pollutant.

TABLE 2-1. RELATIONSHIP AMONG MONITORING OBJECTIVES AND SCALE OF REPRESENTATIVENESS

Monitoring Objectives	Appropriate Siting Scales
Highest concentration	Micro, Middle, neighborhood (sometime urban[1])
Population	Neighborhood, urban
Source impact	Micro, middle, neighborhood
General/Background	Neighborhood, urban, regional
Regional transport	Urban/regional
Welfare-related impacts	Urban/regional

TABLE 2-2. SUMMARY OF SPATIAL SCALES FOR SLAMS AND REQUIRED SCALES FOR NAMS

Spatial Scale	Scales Applicable for SLAMS							Scales Required for NAMS						
	SO_2	CO	O_3	NO_2	Pb	PM_{10}	$PM_{2.5}$	SO_2	CO	O_3	NO_2	Pb	PM_{10}	$PM_{2.5}$
Micro	✓	✓			✓	✓	✓	✓	✓			✓	✓	✓[1]
Middle	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓[1]
Neighborhood	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Urban	✓		✓	✓	✓	✓	✓			✓	✓			✓[2]
Regional	✓		✓		✓	✓	✓							✓[2]

[1]Only permitted if representative of many such micro-scale environments in a residential district (for middle scale, at least two).
[2]Either urban or regional scale for regional transport sites.

2.1.2 Number of SLAMS Sites

Appendix D to 40 CFR Part 58 does not contain criteria for determining the total number of stations in the SLAMS networks except that a minimum number of SLAMS lead,[4] SO_2,[5] and $PM_{2.5}$[6] sites are prescribed. Concerning the number of lead SLAMS monitors,[4] EPA is requiring State and local agencies to focus their network design efforts on establishing lead monitoring stations around lead stationary sources which generate or have the potential to generate exceedances of the quarterly lead NAAQS. A number of these sources have been identified through EPA's ongoing lead NAAQS attainment strategy, and ambient air monitoring stations have already been established around them. Sources around which lead monitoring networks should be established are those emitting five or more tons per year or smaller stationary sources which may be problematic based on the size of the facility and their proximity to populated neighborhoods. EPA recommends a minimum of two lead sites per source, one to measure stack impacts and the second to measure fugitive emissions. Other factors such as topography, source type, proximity and locations of nearby populations may affect the number of stations in the network.

Concerning the number of SLAMS SO_2 monitors,[5] a minimum number are required for those counties not within the boundaries of any Consolidated Metropolitan Statistical Area/Metropolitan Statistical Area (CMSA/MSA). In addition, as listed in Table 2-3, a minimum number of SO_2 SLAMS are required for targeted sources of SO_2 emissions. Other than these requirements, EPA believes that the optimum size of a particular SLAMS network involves tradeoffs among data needs and available resources which can best be resolved during the network design process.

TABLE 2-3. STATE AND LOCAL AIR MONITORING STATIONS CRITERIA FOR SO_2

Area	SO_2 Emissions (tons/year)	Minimum Number of SO_2 Stations
Counties (or parts of counties) not included in any CMSA/MSA	>100,000	2
	20,000-100,000	1
	<20,000	0

2.1.3 Core SLAMS Monitoring Stations for $PM_{2.5}$

Community-oriented core SLAMS $PM_{2.5}$ sites are a subset of the SLAMS $PM_{2.5}$ network that are sited to represent community-wide air quality and are located within monitoring planning areas (MPAs). Such sites are located where people live, work, and play, as opposed to areas of expected maximum concentrations from specific source emissions. MPAs are generally oriented toward areas with populations greater than 200,000, but those portions of a State that are not associated with MSAs can be considered as a single MPA. Within each MPA, the responsible air pollution control agency shall install the following core $PM_{2.5}$ sites:

(a) At least two core $PM_{2.5}$ SLAMS per MSA with population greater than 500,000 sampling everyday, unless exempted by the Regional Administrator, including at least one station in a population-oriented area of expected maximum concentration and at least one station in an area of poor air quality and at least one additional core monitor collocated at a PAMS site if the MPA is also a PAMS area.

(b) At least one core $PM_{2.5}$ SLAMS per MSA with population greater than 200,000 and less than or equal to 500,000 sampling every third day.

(c) Additional core $PM_{2.5}$ SLAMS per MSA with population greater than 1 million, sampling every third day, as specified in Table 2-4.

TABLE 2-4. REQUIRED NUMBER OF CORE SLAMS $PM_{2.5}$ SITES ACCORDING TO MSA POPULATION

MSA Population	Minimum Required No. of Core Sites[1]
>1M	3
>2M	4
>4M	6
>6M	8
>8M	10

[1]Core SLAMS at PAMS are in addition to these numbers.

The site situated in the area of expected maximum concentration is termed a category a core SLAMS site. The site located in the area of poor air quality with high population density or representative of maximum population impact is analogous to NAMS, "category b." This second site is a category b core SLAMS site.

Those MPAs that are substantially impacted by several different and geographically disjoint local sources of fine particulate should have separate core sites to monitor each influencing source region.

Within each MPA, one or more required core SLAMS may be exempted by the Regional Administrator. This may be appropriate in areas where the highest concentration is expected to occur at the same location as the area of maximum or sensitive population impact, or areas with low concentrations (*e.g.*, highest concentrations are less than 80 percent of the NAAQS). When only one core monitor for $PM_{2.5}$ is included in an MPA or optional Community Monitoring Zone (CMZ), however, a "category a" core site is strongly preferred to determine community-oriented $PM_{2.5}$ concentrations in areas of high average $PM_{2.5}$ concentration.

In addition to the required core sites described in section 2.8.1.3 of 40 CFR Part 58 Appendix D, the State shall also install and operate on an every third day sampling schedule at least one SLAMS to monitor for regional background and at least one SLAMS to monitor regional transport. These monitoring stations may be at a community-oriented site and their requirement may be satisfied by a corresponding SLAMS monitor in an area having similar air quality in another State. The State shall also be required to establish additional SLAMS sites based on the total population outside the MSA(s) associated with MPAs that contain required core SLAMS. There shall be one such additional SLAMS for each 200,000 people. The minimum number of SLAMS may be deployed anywhere in the State to satisfy the SLAMS monitoring of small scale impacts which may not be community-oriented or for regional transport. Detailed guidance on designing monitoring networks for $PM_{2.5}$ is contained in reference 7. The document defines concepts and terms of network design, presents a methodology for defining planning areas and community monitoring zones, identifies data

resources and the uses of those resources for network design, and provides some practical examples of applying the guidance.

A table showing the required minimum number of CORE $PM_{2.5}$ SLAMS and other $PM_{2.5}$ SLAMS monitoring sites by State and by MSA/PMSA/Remainder of State is contained on EPA's Ambient Monitoring Technology Information Web page. The table is listed under the $PM_{2.5}$ Monitoring/Network Design area. The address is www.epa.gov/ttn/amtic/pmstg.html.

2.1.4 NAMS Design Criteria

Appendix D also describes monitoring objectives and criteria for determining the number and location of NAMS and PAMS. The primary objective of the NAMS is to monitor in areas where the pollutant concentration and population exposure are expected to be the highest consistent with the averaging time of the NAAQS. The NAMS are a subset of SLAMS that focus on urban and multisource areas. Criteria for determining the number of stations in the NAMS network are specified in Appendix D and summarized in Table 2-5 and 2-6.

The $PM_{2.5}$ NAMS are a subset of the core SLAMS and other regional transport SLAMS. They are intended as long-term monitoring stations concentrated in metropolitan areas. A target range of 200 to 300 NAMS $PM_{2.5}$ stations nationwide has been specified in the regulations. MSAs with a population greater than 1 million must have at least one $PM_{2.5}$ NAMS. The total number is based on recommendations of EPA Regional Offices in partnership with State and local agencies. Criteria for selecting the stations include the number and type of sources, ambient concentration of particulate matter, and regional transport. Table 2-7 shows the target number of NAMS $PM_{2.5}$ stations per Region.

In addition to the range of NAMS sites, States are required to establish about 50 sites for routine chemical speciation of $PM_{2.5}$. The 50 sites will include approximately 25 sites collocated at PAMS sites and 25 other core SLAMS selected by the Administrator.

TABLE 2-5. NAMS MONITORING NETWORK CRITERIA

		Approximate Number of Stations Per Area			
Pollutant	**UA/CMSA/MSA**		**High Concentration[a]**	**Medium Concentration[a]**	**Low Concentration[a]**
CO	>500,000	≥2	NA	NA	NA
Lead	first or second largest CMSA/MSA within each EPA Region	1[b]	NA	NA	NA
NO_2	>1,000,000	≥2	NA	NA	NA
Ozone	>200,000	≥2	NA	NA	NA
PM_{10}[a]	>1,000,000	--	6-10	4-8	2-4
	500,000 - 1,000,000	--	4-8	2-4	1-2
	250,000 - 500,000	--	3-4	1-2	0-1
	100,000 - 250,000		1-2	0-1	0

[a]For PM_{10}

24 Hr 1st MAX Value (µg/m³)		Annual Arithmetic Mean (µg/m³)
≥ 180	(high)	≥ 60
≥ 120	(medium)	≥ 40
≤ 119	(low)	≤ 39

[b]In addition, one NAMS population-oriented site is required in each populated area (either a MSA/CMSA, town or county) where lead violations have been measured over the most recent 8 calendar quarters.

TABLE 2-6. NATIONAL AIR MONITORING STATION CRITERIA FOR SO_2

CMSA/MSA Population	SO_2 Emission (tons/year)	Minimum Required Number SO_2 Stations
>1,000,000	200,000	3
	100,000-200,000	2
	0-100,000	1
200,000-1,000,000	>200,000	3
	100,000-200,000	2
	20,000-100,000	1
	>20,000	0
50,000-200,000	>100,000	2
	20,000-100,000	1
	<20,000	0

TABLE 2-7. GOALS FOR NUMBER OF $PM_{2.5}$ NAMS BY REGION

EPA Region	Number of NAMS[a]	Percent of National Total
1	15 to 20	6 to 8
2	20 to 30	8 to 12
3	20 to 25	8 to 10
4	35 to 50	14 to 20
5	35 to 50	14 to 20
6	25 to 35	10 to 14
7	10 to 15	4 to 6
8	10 to 15	4 to 6
9	25 to 40	10 to 16
10	10 to 15	4 to 6
Total	205-295	100

[a]Each region will have one to three NAMS having the monitoring of regional transport as a primary objective.

2.1.5 PAMS Design Criteria

The PAMS also constitute a subset of the SLAMS and may be located coincident to SLAMS or NAMS sites, as appropriate. 40 CFR Part 58 requires States to establish PAMS as part of their SIP monitoring networks in the most problematic ozone nonattainment areas. While the SLAMS and NAMS address only criteria pollutants, the PAMS stations sample for speciated volatile organic compounds (VOCs) including carbonyls, ozone, oxides of nitrogen (NO_x), and surface (10-meter) and upper air meteorological parameters. The principal reasons for requiring the collection of additional ambient air pollutant and meteorological data are the lack of attainment of the ozone NAAQS nationwide and the need for a more comprehensive air quality database for ozone and its precursors.

The PAMS monitoring objectives are to supply information sufficient to (1) develop responsible and cost-effective ozone control strategies; (2) provide appropriate data support for photochemical grid modeling efforts; (3) allow the reconciliation of emissions inventories; (4) enable characterization of ozone, ozone precursor, and meteorological trends; (5) provide for improved assessments of ozone attainment; and (6) provide a measure of information for determining population exposure.

In contrast to the SLAMS and NAMS network design and siting criteria, which are pollutant specific, PAMS design considerations are site specific. Design criteria for PAMS are based on selection of an array of site locations relative to ozone precursor source areas and predominant wind directions associated with high ozone events. A maximum of five PAMS sites is required in an affected nonattainment area depending on the population of the MSA/CMSA or nonattainment area, whichever is larger. Minimum network requirements are outlined in Table 2-8. As noted in the table, the use of sampling frequencies C or F requires the submittal of an ozone event (peak day) forecasting scheme. The ozone event forecasting and monitoring scheme should be submitted as part of the PAMS network description required by Sections 58.40 and 58.41 and should be reviewed during each annual network review specified in 58.20(d). More specific guidance on PAMS network design is provided in the Updates to sections of the Implementation Manual which are regularly issued. For

TABLE 2-8. PAMS MINIMUM MONITORING NETWORK REQUIREMENTS[a]

Population of MSA/CMSA or Nonattainment Area[b]	Required Site Type[c]	Minimum Speciated VOC Sampling Frequency[d]	Minimum Carbonyl Sampling Frequency[d]
Less than 500,000	1	A or C[e]	
	2	A or C[e]	D or F[e,f]
500,000 to 1,000,000	1	A or C[e]	
	2	B	E
	3	A or C[e]	
1,000,000 to 2,000,000	1	A or C[e]	
	2	B	E
	2	B	E
	3	A or C[e]	
More than 2,000,000	1	A or C[e]	
	2	B	E
	2	B	E
	3	A or C[e]	
	4	A or C[e]	

[a]O_3 and NO_x (including NO and NO_2) monitoring should be continuous measurements.
[b]Whichever area is larger.
[c]See Figure 1 in 40 CFR 58, Appendix D.
[d]Frequency requirements are as follows: A—Eight 3-hour samples ever third day and one additional 24-hour sample every sixth day during the monitoring period; B—Eight 3-hour samples, every day during the monitoring period and one additional 24-hour sample every sixth day year-round; C—Eight 3-hour samples on the 5 peak O_3 days plus each previous day, eight 3-hour samples every sixth day, and one additional 24-hour sample every sixth day, during the monitoring period; D—Eight 3-hour samples every third day during the monitoring period; E—Eight 3-hour samples every day during the monitoring period; F—Eight 3-hour samples on the 5 peak O_3 days plus each previous day and eight 3-hour samples every sixth day during the monitoring period. (NOTE: multiple samples taken on a daily basis must begin at midnight and consist of sequential, nonoverlapping sampling periods.)
[e]The use of frequencies C or F requires the submittal of an ozone event forecasting scheme.
[f]Carbonyl sampling frequency must match the chosen speciated VOC frequency.

example, Appendix N, the *PAMS Technical Assistance Document*, was last issued in October 1994 in draft form, but updates to sections of the TAD have been ongoing. A major revision of the TAD is to be issued in 1998. Check EPA's website for the most current version available.

2.2 APPENDIX E REQUIREMENTS

Appendix E[8] contains siting criteria to be applied to ambient air quality analyzers or samplers after the general site location has been selected based on the monitoring objectives and spatial scales of representativeness presented in Appendix D and summarized in Section 2.1 of this guidance. The siting criteria presented in Appendix E are summarized in Table 2-9.

EPA believes that most sampling probes or monitors can be located so that they meet the Appendix E siting requirements. Some existing stations, however, may not meet these requirements and yet still produce useful data for some purposes. EPA will consider written requests from the State to waive one or more siting criteria for some monitoring stations provided that the State can demonstrate the following: (1) the site is as representative of the monitoring area as it would be if siting criteria were met; and (2) the siting criteria cannot be met because of physical constraints (*e.g.*, inability to locate the required type of station the necessary setback distance from roadways or obstructions). Waivers may be granted to existing SLAMS if one of these criteria are met; waivers may be granted for new SLAMS only if both criteria are met. Written requests for waivers must be submitted to the Regional Administrator. For NAMS, the request will be forwarded to the Administrator or the Administrator's designee.

For all SLAMS or NAMS sites the sampling lines and probe material must be borosilicate glass, FEP teflon, or their equivalent. For those SLAMS designated as PAMS for VOC and carbonyl sampling, only borosilicate glass, stainless steel, or their equivalent are acceptable probe materials. Also, sampling probes for reactive gas monitors at SLAMS or NAMS must have a sample residence time less than 20 seconds.

TABLE 2-9. SUMMARY OF PROBE AND MONITORING PATH SITING CRITERIA

Pollutant	Scale [maximum monitoring path length, meters]	Height from ground to probe or 80% of monitoring path[a] (meters)	Horizontal and vertical distance from supporting structures[b] to probe or 90% of monitoring path[a] (meters)	Distance from trees to probe or 90% of monitoring path[a] (meters)	Distance from roadways to probe or monitoring path[a] (meters)
SO_2[c,d,e,f]	Middle [300m] Neighborhood, Urban, and Regional [1km].	3-15	>1	>10	N/A
CO[d,e,g]	Micro Middle [300m] Neighborhood [1km].	3±0.5; 3-15	>1	>10	2-10; See Table 2[i] for middle and neighborhood scales.
O_3[c,d,e]	Middle [300m] Neighborhood, Urban, and Regional [1km].	3-15	>1	10	See Table 1[i] for all scales.
Ozone precursors (for PAMS)[c,d,e]	Neighborhood and Urban. [1km]	3-15	>1	>10	See Table 4[i] for all scales.
NO_2[c,d,e]	Middle [300m] Neighborhood and Urban [1km].	3-15	>1	>10	See Table 1[i] for all scales.
Pb[c,d,e,f,h]	Micro; Middle, Neighborhood, Urban and Regional.	2-7 (Micro); 2-15 (All other scales).	>2 (All scales, horizontal distance only).	>10 (All scales)	5-15 (Micro); See Table 3[i] for all other scales.
PM_{10}[c,d,e,f,h]	Micro; Middle, Neighborhood, Urban and Regional.	2-7 (Micro); 2-15 (All other scales).	>2 (All scales, horizontal distance only).	>10 (All scales)	2-10 (Micro); See Figure 2[i] for all other scales.

N/A-Not applicable.
[a]Monitoring path for open path analyzers is applicable only to middle or neighborhood scale CO monitoring and all applicable scales for monitoring SO_2, O_3, O_3 precursors, and NO_2.
[b]When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.
[c]Should be >20 meters from the dripline of tree(s) and must be 10 meters from the dripline when the tree(s) act as an obstruction.
[d]Distance from sampler, probe, or 90% of monitoring path to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler, probe, or monitoring path. Sites not meeting this criterion may be classified as middle scale (see text).
[e]Must have unrestricted airflow 270° around the probe or sampler; 180° if the probe is on the side of a building.
[f]The probe, sampler, or monitoring path should be away from minor sources, such as furnace or incineration flues. The separation distance is dependent on the height of the minor source's emission point (such as a flue), the type of fuel or waste burned, and the quality of the fuel (sulfur, ash, or lead content). This criterion is designed to avoid undue influences from minor sources.
[g]For microscale CO monitoring sites, the probe must be >10 meters from a street intersection and preferably at a midblock location
[h]For collocated Pb and PM_{10} samplers, a 2-4 meter separation distance between collocated samplers must be met
[i]Tables and Figure are in Appendix E of 40 CFR Part 58.

2.3 OTHER AMBIENT AIR MONITORING DATA NEEDS

In addition to the 40 CFR Part 58 Appendix D and E regulatory network requirements pertaining to the number and location of ambient air monitoring stations established by State and local agencies, there are a number of other ambient air monitoring data needs and uses that should be considered when conducting State annual network reviews. EPA addresses some of these additional ambient air data needs in its 1997 strategic plan, "Preparing for a New Era of Environmental Protection,"[9] which was developed in response to the Government Performance and Results Act (GPRA). The strategic plan addresses EPA's mission, goals, strategies to meet those goals, and performance measures for determining progress towards those goals.

EPA's clean air objectives focus on improving ambient air quality and visibility, reducing emissions of toxic and other air pollutants, bringing all areas of the country into compliance with national air quality standards, and reducing acid rain. EPA will measure performance in these areas by directly measuring concentrations of air pollutants, calculating and estimating emissions of air pollutants, measuring acidic deposition and concentrations in rainfall, measuring visibility, and tracking the number and status of nonattainment areas.

Examples of additional monitoring data needs or performance measures and indicators to be used or reported include trends in air quality for each of the criteria pollutants; number of days when one or more air quality standards is exceeded in the nation's largest metropolitan areas, change in average annual visibility impairment in national parks and wilderness areas (Class I areas), average annual sulfate and nitrate concentrations in rainfall, and concentration and dry deposition of sulfate and nitrate in particles. To help meet these data needs, the EPA, in conjunction with the Environmental Commission of the States (ECOS), has established the National Environmental Performance Partnership System (NEPPS). In 1997, nearly half the States have Performance Partnership Agreements (PPAs) in place with EPA. Through these agreements, EPA and States determine together what work, including the collection of ambient air quality data, will be performed on an annual basis and how that work will be accomplished. Conformance with the air monitoring performance measures contained in these PPAs should also be determined during the annual review.

A checklist for determining conformance with (non-regulatory) special monitoring program requirements such as these is included in Section 4.

3.0 NETWORK REVIEW PROCEDURE

3.1 NETWORK REVIEW TEAM AND PREPARATION

Network review participants should include Regional Office and State agency personnel who are experienced in conducting network reviews and are familiar with the procedures described in this guidance. Regional Office participants might include the State Programs or Air Monitoring Section or Branch Chief; the SLAMS, NAMS, and/or PAMS Coordinators; the AIRS contact; and the Quality Assurance Officer. State agency participants might include field technicians, engineers, chemists, air modelers, AIRS data processors, and other computer specialists.

Depending on available resources, network reviews may be conducted off-site (when resources are limited) or on-site (when resources permit). In either case, sufficient information must be provided to determine conformance of the network with regulatory network design and siting requirements specified in 40 CFR Part 58, Appendices D and E as well as to determine conformance of the network design and siting requirements specified for all special ambient air monitoring networks.

Because the conduct of comprehensive network reviews is resource-intensive, it may be necessary to prioritize agencies and/or pollutants to be reviewed. The following criteria are suggested for the selection process:

- Determine if the agency is operating and maintaining the required number of monitors as described in 40 CFR Part 58 in a manner which reflects the regulation's intent
- Determine if the agency is meeting the number of monitors required by all special monitoring networks (*e.g.*, visibility, wet and dry deposition)
- Determine if the agency is operating existing special network monitors in accordance with applicable documented requirements
- Consider when the last review was conducted
- Consider areas where attainment/nonattainment redesignations are taking place or are likely to take place
- Consider results of special studies, saturation sampling, point source oriented ambient monitoring, etc.
- Consider agencies which have proposed network modifications since the last network review

- Consider agencies and networks which have not had any modifications or reviews in recent history that may have experienced significant population or emissions increases

In addition, pollutant-specific priorities may be considered (*e.g.*, newly designated ozone nonattainment areas, PM_{10} "problem areas", etc.).

Once the agencies have been selected for review, significant data and information pertaining to the review should be compiled and evaluated. Such information might include the following:

1. network files for the selected agency (including updated site information and site photographs)

   A. AIRS reports (See Appendix A)
      - AMP220, Monitoring Network Report
      - AMP225, PAMS Network Report
      - AMP380, Site Description Inventory
      - AMP390, Site Monitor Status
      - AMP450, Quick Look Report
      - AIRS Graphics Maps

   B. air quality summaries for the past five years for the monitors in the network

   C. emissions trends reports for major metropolitan area

   D. emission information, such as emission density maps for the region in which the monitor is located, and emission maps showing the major sources of emissions (see Appendix B)

   E. National Weather Service summaries for monitoring network area

   F. Topographical maps

2. Check information for last revision data
3. Check information for consistency
4. Note discrepancies on checklist and resolve with agency during network review. Any discrepancies between the Agency network description and AIRS network description should

be noted and resolved with the agency during the review. Files and/or photographs that need to be updated should also be identified.

5. Note whether the description of the network included in the QA Plan(s) is (are) correct. If not, the description(s) should be updated.

AIRS Executive may be used to provide an executive summary of AIRS information that can be viewed quickly and easily on a PC. AIRS Executive contains a subset of data extruded from AIRS and is a useful tool in looking at certain site and air quality data.

3.2 NETWORK MODIFICATIONS

Modifications to the SLAMS, NAMS, and PAMS networks are addressed in 40 CFR 58.25, 58.36, and 58.46, respectively. Under Section 58.25, States are required to annually develop and implement schedules to modify the SLAMS network to eliminate any unnecessary stations or to correct any inadequacies indicated by the annual network review required by 58.20(d). During the annual review, any changes to the NAMS network identified by the EPA and/or proposed by the State and agreed to by the EPA will also be evaluated. As specified in Section 58.36, the State is given one year (until the next annual review) to implement the appropriate changes to the NAMS network. As part of the annual network review, evaluations of the special networks established as partnership agreements between EPA and States should also be conducted. Modifications to these networks should be recommended as a result of this annual review.

An important objective of the network modification process is determining whether or not sufficient ambient air quality information and data are being provided by the regulatory and other special monitoring networks to satisfy the principal data needs. If sufficient air quality data are not being collected, the deficient areas must be identified and corrective action taken to resolve the problem. Conversely, if it is determined that excessive data are being collected (*e.g.*, there are redundant sites resulting in data that agree closely), then efforts need to be taken to determine where disinvestment should be made and on what schedule.

Network modifications may be initiated by the Regional Offices or proposed by the State and agreed to by the EPA. Network modifications may result from revisions to the Part 58 regulations, systems audits, site visits, or performance evaluations; special studies/saturation sampling; population increases/decreases; air quality concentrations consistently recorded below the NAAQS; loss of permission to use a site; demolition of a building which is used for monitoring; building construction; growth of trees; changes in roadways; change in neighborhood type of use, etc. In addition, modification may result from revisions to EPA/State PPAs.

In 1996, the Emissions, Monitoring and Analysis Division of EPA's Office of Air Quality Planning and Standards initiated a series of meetings, conference calls, and other correspondence with EPA Regions and State and local agencies for the purpose of "Re-Engineering" or restructuring the ambient air monitoring program. The first phase of this re-engineering process was designed to identify ambient monitoring program elements that could be modified over the short-term to generate cost savings to be directed toward new $PM_{2.5}$ monitoring efforts.

The EPA, with input from Regional Offices and State and local agencies, identified a number of actions to be considered to generate savings which could be directed towards new monitoring efforts such as $PM_{2.5}$ or expanded ozone monitoring.

The full report of the Reengineering Air Monitoring Networks Phase I results is included as Appendix C. The report includes a summary of the work group efforts to provide suggestions for modifying or reengineering the existing air monitoring networks. The report also includes a discussion on potential savings for PAMS and criteria pollutants, the need for an improved oxides of nitrogen database, and the need for implementing a new $PM_{2.5}$ monitoring network. Additional topics addressed include the operation of several NARSTO Northeast sites by government and private sector/academic groups, the management of the CASTNET program, the development of a population-based exposure network for monitoring radioactivity of atmospheric aerosols, and the importance of an increased emphasis on PAMS data analysis. The report closes with a discussion of the topic "Continuing Reengineering Objectives."

3.3 GUIDANCE TO DETERMINE CONFORMANCE WITH APPENDIX D AND SPECIAL MONITORING REQUIREMENTS

With regard to Appendix D requirements, the network reviewer must determine the adequacy of the network in terms of number and location of monitors. Specifically, (1) is the agency meeting the number of monitors required by the Part 58 Appendix D design criteria requirements?; and (2) are the monitors properly located based on the monitoring objectives and spatial scales of representativeness presented in Appendix D? For special monitoring networks, conformance determinations would be conducted in accordance with program documents applicable to the special networks.

3.3.1 Number and Location of Monitors

For SLAMS, which are not identified as NAMS or PAMS, the number of monitors required is not specified in the regulations but rather is determined by the Regional Office and State agencies on a case-by-case basis to meet the monitoring objectives specified in Appendix D. Adequacy of the network may be determined by using a variety of tools, including the following:

- analyses of historical monitoring data
- maps of emission densities
- dispersion modeling
- special studies/saturation sampling
- best professional judgement
- SIP requirements
- revised monitoring strategies (*e.g.*, new regulations, lead strategy, reengineering air monitoring network)
- monitoring network maps and network descriptions with site objectives defined

Information needed to make these determinations includes the following types of data:

- emission inventory
  - State based
  - AIRS

- meteorological
- climatological
- traffic
- topographical
- historical
  - population
  - economic activity
- projections
  - population
  - economic activity
- photographs of current and potential sites
- citizen complaints and public interest in monitoring network
- enforcement actions

For NAMS, areas to be monitored must be selected based on urbanized population and pollutant concentration levels. To determine whether the number of NAMS is adequate, the number of NAMS operating is compared to the number of NAMS specified in 40 CFR 58 Appendix D and summarized in Table 2-5 in this guidance. The number of NAMS operating can be determined from the AMP220 report in AIRS. The number of monitors required based on concentration levels and population can be determined from the AMP450 report and the latest census population data.

For PAMS, the required number and type of monitoring sites and sampling requirements are based on the population of the affected MSA/CMSA or ozone nonattainment area (whichever is larger). PAMS minimum monitoring network requirements are summarized in Table 2-8.

For SLAMS, the location of monitors is not specified in the regulations, but is determined by the Regional Office and State agencies on a case-by-case basis to meet the monitoring objectives specified in Appendix D. Adequacy of the location of monitors can only be determined on the basis of stated objectives. Many, if not all, of the tools and data listed in Section 3.3.1 for assessing the adequacy of the number of monitors are also useful for assessing the adequacy of monitor locations. In particular, maps, graphical overlays, and GIS-based information is extremely helpful in visualizing or assessing the adequacy of monitor locations. Plots of potential emissions and/or historical monitoring data versus monitor locations are especially useful. When questions arise about the

adequacy of a particular location, modeling or special studies (including saturation monitoring studies) may be appropriate.

For NAMS, locations are based on the objectives specified in Appendix D, Section 3. Most often, these locations are those that have high concentrations and large population exposure. Population information may be obtained from the latest census data and ambient monitoring data from the AMP450 Quick Look Report. If the zip codes for various monitoring locations are obtained, use of electronic media census information and GIS-based information can be more easily combined with ambient monitoring data.

For PAMS, there is considerable flexibility when locating each PAMS within a nonattainment area or transport region. The three fundamental criteria which need to be considered when locating a final PAMS site are: (1) sector analysis - the site needs to be located in the appropriate downwind (or upwind) sector (approximately 45°) using appropriate wind directions; (2) distance - the sites should be located at distances appropriate to obtain a representative sample of the areas precursor emissions and represent the appropriate monitoring scale; and (3) proximate sources.

For special monitoring for PPA, visibility, wet and dry deposition, etc., program documents applicable to the network must be reviewed to determine the goals and specific siting criteria for the network. Conformance with monitoring objective determinations of the special network should be conducted using procedures similar to those used for Appendix D evaluations (*i.e.*, are the number of monitors appropriate and are the monitors properly located).

3.3.2 Checklists and Other Discussion Topics

Checklists are provided in Section 4.0 to assist network reviewers (SLAMS, NAMS, and PAMS and special monitoring) in conducting the review. In addition to the items included in the checklists, other subjects for possible discussion as part of the network review and overall adequacy of the monitoring program include:

- installation of new monitors
- relocation of existing monitors
- siting criteria problems and suggested solutions
- problems with data submittals and data completeness
- maintenance and replacement of existing monitors and related equipment
- data quality and other quality assurance problems
- air quality studies and special monitoring programs
- other issues
  - proposed regulations
  - funding
  - etc.

3.4 GUIDANCE TO DETERMINE CONFORMANCE WITH APPENDIX E REQUIREMENTS

Applicable siting criteria for SLAMS, NAMS, and PAMS are specified in 40 CFR 58, Appendix E. Because of limited travel funds, the number of on-site visits may have to be distributed as resources permit (*e.g.*, 5 to 20 percent of sites visited per year). The on-site visit itself consists of the physical measurements and observations needed to determine compliance with the Appendix E requirements, such as height above ground level, distance from trees, paved or vegetative ground cover, etc.

Prior to the site visit, the reviewer should obtain and review the following:

- most recent hard copy of site description (including any photographs)
- data on the seasons with the greatest potential for high concentrations for specified pollutants
- predominant wind direction by season

The following materials should be brought to the site under review:

1. field notebook
2. tape measure, measuring wheel, and/or range measuring system
3. compass or clinometer
4. camera with normal lens or video camcorder
5. most recent hard copy of site description

6. copy of Appendix E probe siting criteria regulations
7. review checklist for applicable pollutant(s)
8. data on seasons for greatest pollutant concentrations and predominant wind direction(s) by season

The checklist provided in Section 4.0 is also intended to assist the reviewer in determining conformance with Appendix E. In addition to the items on the checklist, the reviewer should also do the following:

- ensure that the manifold and inlet probe are clean
- estimate probe and manifold inside diameters and lengths
- inspect the shelter for weather leaks, safety, and security
- check equipment for missing parts, frayed cords, etc.
- check that monitor exhausts are not likely to be reentrained by the inlet
- record findings in field notebook and/or checklist
- take photographs/videotape in the 8 directions
- document site conditions, with additional photographs/videotape

3.5 SUMMARY OF FINDINGS

Upon completion of the network review, a written network evaluation should be prepared. The evaluation should include any deficiencies identified in the review, corrective actions needed to address the deficiencies, and a schedule for implementing the corrective actions. The kinds of discrepancies/deficiencies to be identified in the evaluation include discrepancies between the Agency network description and the AIRS network description; and deficiencies in the number, location, and/or type of monitors. The network evaluation should also highlight examples of what the network does well, especially if deficiencies are relatively minor. Regions are encouraged to send copies of the SLAMS, NAMS, and PAMS network reviews to OAQPS's Monitoring and Quality Assurance Group.

4.0 NETWORK REVIEW CHECKLISTS

The following checklists are intended to assist reviewers in conducting a network review. The checklist will help the reviewer to determine if the NAMS/SLAMS/PAMS regulatory network conforms with the network design and siting requirements specified in Appendices D and E and with other special monitoring requirements. Section I of the checklist includes general information on the network. Section II addresses conformance with Appendix D requirements. Section III includes pollutant-specific evaluation forms to address conformance with Appendix E requirements. Section IV addresses conformance with special monitoring program requirements. In addition to completing the checklist during the network review, the action items cited in Section 3.4 should also be used as a guide during an onsite visit of a monitoring station.

NETWORK REVIEW CHECKLIST

SECTION I - GENERAL INFORMATION

Reviewer: | **Review Date:**

1. State or Local Agency:

   Address

   Contact

   Telephone Number

2. Type of network review (check all that apply)
   ☐SLAMS ☐NAMS ☐PAMS ☐SPM ☐Other[a]

3. Network Summary Description
   Number of sites currently operating or temporarily inoperative (≤30 days), not including collocated or index sites.

	Site Type				
	SLAMS(excluding NAMS/PAMS)	NAMS	PAMS	SPM	Other[a]
CO			---		
Pb			---		
NO_2					
O_3					
$PM_{2.5}$					
PM_{10}			---		
SO_2					
VOC	---	---			
Carbonyls	---	---			
NO_y					
Surface Met					
Upper Air Met					

4. Network Description
   Date of most current official network description? _____

	Yes	No
Copy available for review?	☐	☐
For each site, are the following items included:		
AIRS Site ID	☐	☐
Sampling and Analysis Method	☐	☐
Operative Schedule	☐	☐
Monitoring Objective	☐	☐
Scale of Representativeness	☐	☐
Zip Code	☐	☐
Information on three closest roads	☐	☐
Any Proposed Changes	☐	☐

5. Date of last network review? _____

6. Modifications made since last network review

	Number of Monitors		
	Added	Deleted	Relocated
CO			
Pb			
NO_2			
O_3			
$PM_{2.5}$			
PM_{10}			
SO_2			
Total Suspended Particulate			
For PAMS:			
VOC			
Carbonyls			
NO_y			
Surface Met			
Upper Air Met			

7. Network Design and Siting
Summarize any nonconformance with the requirements of 40 CFR 58, Appendices D and E found in Sections II and III, and/or with other requirements found in Section IV.

	AIRS Site ID	Site Type	Reason for Nonconformance
CO			
Pb			
NO_2			
O_3			
$PM_{2.5}$			
PM_{10}			
SO_2			
VOC			
Carbonyls			
NO_y			
Surface Met			
Upper Air Met			

8. List problems found, actions to be taken, corrective measures, etc. called for in the last network review that still have not been addressed.

[a]Visibility, wet/dry deposition, etc.

SECTION II - EVALUATION OF CONFORMANCE WITH APPENDIX D REQUIREMENTS

	Yes	No
1. Is the Agency meeting the number of monitors required based on 40 CFR Part 58 requirements?		
SLAMS	☐	☐
NAMS	☐	☐
PAMS	☐	☐

If no, explain:

	Yes	No
2. Is the Agency operating existing monitors according to 40 CFR Part 58 requirements?		
SLAMS	☐	☐
NAMS	☐	☐
PAMS	☐	☐

If no, explain:

	Yes	No
3. Are monitors properly located based on monitoring objectives and spatial scales of representativeness specified in Appendix D?		
SLAMS	☐	☐
NAMS	☐	☐
PAMS	☐	☐

If no, explain:

	Yes	No
4. For PAMS, when C or F sampling frequency is used, has an ozone event forecasting scheme been submitted and reviewed?	☐	☐

If no, explain:

Network Design/Review Determined by (check all that apply)

☐ Dispersion modeling ☐ Special studies (including saturation sampling)

☐ Best professional judgement ☐ Other (specify _____)

Comment (for example, SO_2 dispersion modeling for urbanized area A; PM_{10} saturation study for urbanized area B, etc.)

Evaluation was based on the following information (check all that apply):

☐ emission inventory data ☐ traffic data ☐ AIRS site reports

☐ meteorological data ☐ topographic data ☐ site photographs, videotape, etc.

☐ climatological data ☐ historical data ☐ other (specify _____)

SECTION III - EVALUATION OF CONFORMANCE WITH APPENDIX E REQUIREMENTS

IIIA - CARBON MONOXIDE NAMS/SLAMS SITE EVALUATION

Agency Site Name : _____

Make and Model # of Instrument : _____

Site Address : _____

City & State : _____

AIRS Site ID : _____

Date : _____

Observed by : _____

CRITERIA*	REQUIREMENTS*	OBSERVED	CRITERIA MET?	
			Yes	No
Horizontal and Vertical Probe Placement (Par. 4.1)	3 ±½ m for microscale			
	3-15 m for middle and neighborhood scale			
Spacing from Obstructions (Par. 4.2)	≥270° or 180° if on side of building			
Spacing from Roads (Par. 4.3)	2-10 m from edge of nearest traffic lane for microscale; ≥10 m from intersection, preferably at midblock			
	See Table 1 for middle and neighborhood scale			
Spacing from Trees (Par 4.4)	Should be ≥10 m from dripline of trees if tree is ≥5m above sampler and is between the probe and the road		N/A	
Comments				

*Citations from 40 CFR 58, Appendix E.

IIIB - LEAD NAMS/SLAMS SITE EVALUATION

Agency Site Name : _____

Make and Model # of Instrument : _____

Site Address : _____

City & State : _____

AIRS Site ID : _____

Date : _____

Observed by : _____

CRITERIA*	REQUIREMENTS*	OBSERVED	CRITERIA MET?	
			Yes	No
Vertical Probe Placement (Par. 7.1)	2-7 m above ground for microscale			
	2-15 m above ground for other scales			
Obstructions on Roof (Par. 7.2)	≥ 2 m from walls, parapets, penthouses, etc.			
Obstacle Distance (Par. 7.2)	2 x height differential			
Unrestricted Airflow (Par. 7.2)	At least 270° (except for street canyon sites)			
Furnace or Incinerator Flues (Par. 7.2)	**Recommended** that none are in the vicinity		N/A	
Spacing from Station to Road (Par. 7.3)	5-15 m for microscale			
	See Table 4 for other scales			
Spacing from Trees (Par. 7.4)	Microscale and middle scale must not be any trees between source (vehicles) and sampler			
	Neighborhood scale should be ≥ 20 m from dripline of trees		N/A	
	Neighborhood scale must be ≥10 m if trees are an obstruction			
Comments				

*Citations from 40 CFR 58, Appendix E.

IIIC - NITROGEN DIOXIDE NAMS/SLAMS SITE EVALUATION

Agency Site Name : _____

Make and Model # of Instrument : _____

Site Address : _____

City & State : _____

AIRS Site ID : _____

Date : _____

Observed by : _____

CRITERIA*	REQUIREMENTS*	OBSERVED	CRITERIA MET?	
			Yes	No
Vertical Probe Placement (Par. 6.1)	3-15 m above ground			
Spacing from Supporting Structure (Par. 6.1)	Greater than 1 m			
Obstacle Distance (Par. 6.2)	≥ Twice the height the obstacle protrudes above probe			
Unrestricted Airflow (Par. 6.2)	Must be 270° or 180° if on side of building			
Spacing between Station and Roadway (Par. 6.3)	See Table 3			
Spacing from Trees (Par. 6.4)	Should be ≥ 20 m from dripline of trees		N/A	
	Must be ≥10 m from dripline if trees are an obstruction**			
Probe Material (Par. 9)	Teflon or pyrex glass			
Residence Time (Par. 9)	Less than 20 seconds			
Comments				

*Citations from 40 CFR 58, Appendix E.

**A tree is considered an obstruction if it protrudes above the height of the probe by 5 meters or more.

IIID - OZONE NAMS/SLAMS SITE EVALUATION

Agency Site Name : _____

Make and Model # of Instrument : _____

Site Address : _____

City & State : _____

AIRS Site ID : _____

Date : _____

Observed by : _____

CRITERIA*	REQUIREMENTS*	OBSERVED	CRITERIA MET?	
			Yes	No
Vertical Probe Placement (Par. 5.1)	3-15 m above ground			
Spacing from Supporting Structure (Par. 5.1)	Greater than 1 m			
Obstacle Distance (Par. 5.2)	≥ Twice the height the obstacle protrudes above probe			
Unrestricted Airflow (Par. 5.2)	Must include predominant wind. 180° if on side of building. Otherwise 270°			
Spacing between Station and Roadway (Par. 5.3)	See Table 2			
Spacing from Trees (Par. 5.4)	Should be ≥ 20 m from dripline		N/A	
	Must be ≥ 10 m if blocking daytime wind from urban core			
Probe Material (Par. 9)	Teflon or pyrex glass			
Residence Time (Par. 9)	Less than 20 seconds			
Comments				

*Citations from 40 CFR 58, Appendix E.

IIIE - $PM_{2.5}$ NAMS/SLAMS SITE EVALUATION

Agency Site Name :

Make and Model # :
of Instrument

Site Address :

City & State :

AIRS Site ID :

Date :

Observed by :

CRITERIA*	REQUIREMENTS*	OBSERVED	CRITERIA MET?	
			Yes	No
Vertical Probe Placement (Par. 8.1)	2-7 m above ground for microscale			
	2-15 m above ground for other scales			
Obstructions on Roof	≥ 2 m from walls, parapets, penthouses, etc.			
Spacing from Trees (Par. 8.2)	Should be ≥ 20 m from dripline of trees		N/A	
	Must be ≥ 10 m from dripline if trees are an obstruction**			
Obstacle Distance (Par. 8.2)	2 x height differential (street canyon sites exempt)			
Unrestricted Airflow (Par. 8.2)	At least 270° including the predominant wind direction			
Furnace or Incinerator Flues (Par. 8.2)	**Recommended** that none are in the vicinity		N/A	
Distance between Collocated Monitors (Appendix A, Par. 3.5.2)	1 to 4 m			
Spacing from Station to Road (Par. 8.3)	See Par. 8.3 and/or Figure 2 of Appendix E			
Paving (Par. 8.4)	Area **should** be paved or have vegetative ground cover		N/A	
Comments				

*Citations from 40 CFR 58, Appendix E.

**A tree is considered an obstruction if the distance between the tree(s) and the sampler is less than the height that the tree protrudes above the sampler.

IIIF - PM_{10} NAMS/SLAMS SITE EVALUATION

Agency Site Name :

Make and Model # :
of Instrument

Site Address :

City & State :

AIRS Site ID :

Date :

Observed by :

CRITERIA*	REQUIREMENTS*	OBSERVED	CRITERIA MET?	
			Yes	No
Vertical Probe Placement (Par. 8.1)	2-7 m above ground for microscale			
	2-15 m above ground for other scales			
Obstructions on Roof	≥ 2 m from walls, parapets, penthouses, etc.			
Spacing from Trees (Par. 8.2)	Should be ≥ 20 m from dripline of trees		N/A	
	Must be ≥ 10 m from dripline if trees are an obstruction**			
Obstacle Distance (Par. 8.2)	2 x height differential (street canyon sites exempt)			
Unrestricted Airflow (Par. 8.2)	At least 270° including the predominant wind direction			
Furnace or Incinerator Flues (Par. 8.2)	**Recommended** that none are in the vicinity		N/A	
Distance between Collocated Monitors (Appendix A, Par. 3.3)	2 to 4 m			
Spacing from Station to Road (Par. 8.3)	See Par. 8.3 and/or Figure 2 of Appendix E			
Paving (Par. 8.4)	Area **should** be paved or have vegetative ground cover		N/A	
Comments				

*Citations from 40 CFR 58, Appendix E.

**A tree is considered an obstruction if the distance between the tree(s) and the sampler is less than the height that the tree protrudes above the sampler.

IIIG - SULFUR DIOXIDE NAMS/SLAMS SITE EVALUATION

Agency Site Name : _____

Make and Model # of Instrument : _____

Site Address : _____

City & State : _____

AIRS Site ID : _____

Date : _____

Observed by : _____

CRITERIA*	REQUIREMENTS*	OBSERVED	CRITERIA MET?	
			Yes	No
Horizontal and Vertical Probe Placement (Par. 3.1)	3-15 m above ground			
	> 1 m from supporting structure			
	Away from dirty, dusty areas			
	If on side of building, should be on side of prevailing winter wind		N/A	
Spacing from Obstructions (Par. 3.2)	≥ 1 m from walls, parapets, penthouses, etc.			
	If neighborhood scale, probe must be at a distance ≥ twice the height the obstacle protrudes above probe			
	≥270° arc of unrestricted airflow around vertical probes and wind during peak season must be included in arc			
	180° if on side of building			
	No furnace or incineration flues or other minor sources of SO_2 should be nearby		N/A	
Spacing from Trees (Par. 3.3)	Should be ≥ 20 m from dripline of trees		N/A	
	≥ 10 m when trees act as an obstruction			

*Citations from 40 CFR 58, Appendix E.

SECTION IV - EVALUATION OF CONFORMANCE WITH SPECIAL MONITORING PROGRAM REQUIREMENTS

Applicable Program
(*e.g.*, visibility, wet
deposition, dry deposition) : _____

Make and Model #
of Instruments : _____

Agency Site Name : _____

Site Address : _____

City & State : _____

AIRS Site ID : _____

Date : _____

Observed by : _____

References for Requirements : _____
(*e.g.*, visibility, SOPs including siting criteria)

Are checklists, review forms included in references for requirements?

☐ Yes ☐ No ☐ Some

If some or yes, give number of forms _____. Attach complete forms to sheet.
Include additional criteria below.

CRITERIA	REQUIREMENT	REFERENCE	OBSERVED	CRITERIA MET?		
				Yes	No	N/A

Comments

5.0 REFERENCES

1. *Code of Federal Regulations*, Title 40, Part 58, "Ambient Air Quality surveillance and Data Reporting," U.S. Government Printing Office, 1997.

2. *Code of Federal Regulations*, Title 40, Part 58, Appendix D, Network Design for State and Local Air Monitoring Stations (SLAMS), National Air Monitoring Stations (NAMS), and Photochemical Assessment Monitoring Stations (PAMS), U.S. Government Printing Office, 1997.

3. *Code of Federal Regulations*, Title 40, Part 58, Appendix D, Section 6. References, Network Design for State and Local Air Monitoring Stations (SLAMS), National Air Monitoring Stations (NAMS), and Photochemical Assessment Monitoring Stations (PAMS), U.S. Government Printing Office, 1997.

4. "Ambient Air Quality Surveillance for Lead," Proposed Direct Final Rule. Contained in EPA's AMTIC web page, under Regulations/Proposed Regulations Parts 50, 53, 58, document description is "Revision to Lead NAAQS will be final 15 days after comment period if no adverse comments are received."

5. "Requirements for Implementation Plans and Ambient Air Quality Surveillance for Sulfur Oxides (Sulfur Dioxide) National Ambient Air Quality Standards," *Federal Register*, Vol. 60, No. 44, March 7, 1995, pp. 12492-12519.

6. "Revised Requirements for Designation of Reference and Equivalent Methods for PM2.5 and Ambient Air Quality Surveillance for Particulate Matter; Final Rule," *Federal Register*, Vol. 62, No. 138, July 18, 1997.

7. U.S. Environmental Protection Agency. Guidance for Network Design and Optimum Site Exposure for $PM_{2.5}$ and PM_{10}. Prepared by Desert Research Institute, U.S. EPA/OAQPS, NOAA, December 15, 1997.

8. *Code of Federal Regulations*, Title 40, Part 58, Appendix E, Probe Siting Criteria for Ambient Air Quality Monitoring, U.S. Government Printing Office, 1997.

9. "Preparing for a New Era of Environmental Protection," U.S. EPA, 1997.

APPENDIX A

AMP220
AMP225
AMP380
AMP390
AMP450

MONITOR TYPE (1): NAMS
STATE: 34 NEW JERSEY REGION: 02

URBANIZED AREA (6160): PHILADELPHIA, PA-NJ

SITE ID	POLL	POC	REQD SAMP FREQ	ADDRESS / MONITORING OBJECTIVE / MEASUREMENT SCALE	MET-APP:A DATE	OPER DATE	SITE-CRIT MET	SITE-CRIT DATE	PROBE HT (M)	ACTION TAKEN REASON	--ROAD DESCRIPTION--- STREET NUM	DIST (M)	TRAFFIC (ADT)
34-007-0003	SO2	2		COPEWOOD E. DAVIS STS; TRAILER POPULATION EXPOSURE NEIGHBORHOOD - 500 M TO 4KM	81/01	68/01/01	YES	68/01	5	APP	3	150	3000
	O3	1		COPEWOOD E. DAVIS STS; TRAILER MAXIMUM CONCENTRATION URBAN SCALE - 4 KM TO 50 KM	81/01	68/01/01	YES	68/01	5	APP	2	430	14000
	PM	2	6	COPEWOOD E. DAVIS STS; TRAILER POPULATION EXPOSURE NEIGHBORHOOD - 500 M TO 4KM	91/08	91/08/04	YES	91/08	5	APP	2 1	430 915	14000 45000
34-007-0005	PM	1	6	LIBRARY,RUTGERS UNIV., NORTH F MAXIMUM CONCENTRATION NEIGHBORHOOD - 500 M TO 4KM	87/04	87/04/09	YES	87/04	10	APP	1 2	120 120	68000 60000
34-007-1007	PM	2	6	PENNSAUKEN TWP; MORRIS-DELAIR MAXIMUM CONCENTRATION NEIGHBORHOOD - 500 M TO 4KM	87/05	87/05/30	YES	87/05	3	APP	1 2	460 120	10000 2000

DATE 03/19/98 EPA AEROMETRIC INFORMATION RETRIEVAL SYSTEM (AIRS)
AMP220 AIR QUALITY SUBSYSTEM
MONITORING NETWORK REPORT

MONITOR TYPE (1): NAMS
STATE: 34 NEW JERSEY REGION: 02

URBANIZED AREA (8480): TRENTON, NJ-PA

SITE ID	POLL	POC	REQD SAMP FREQ	ADDRESS / MONITORING OBJECTIVE / MEASUREMENT SCALE	MET-APP:A DATE	OPER DATE	SITE-CRIT MET	SITE-CRIT DATE	PROBE HT (M)	ACTION TAKEN REASON	--ROAD DESCRIPTION--- STREET NUM	DIST (M)	TRAFFIC (ADT)
34-021-0005	O3	1		RIDER COLLEGE;LAWRENCE TOWNSHI POPULATION EXPOSURE NEIGHBORHOOD - 500 M TO 4KM	81/06	81/06/01	YES	81/06	4	APP	1	183	64000
34-023-0006	O3	1		RYDERS LANE & LOG CABIN ROAD MAXIMUM CONCENTRATION URBAN SCALE - 4 KM TO 50 KM	81/03	81/03/18	YES	81/03	4	APP	1	320	63000

MONITOR TYPE (6): PAMS METEORLOGICAL AND VOC
REGION: 09
STATE (06): CALIFORNIA
( ):

SITE-INFORMATION---------- MONITOR INFORMATION----------

SITE-ID
ADDRESS
CITY, STATE
TYPE SITE / DESCRIPTION

ROAD (#) / NAME / TRAFFIC FLOW	PARAMETER / DESCRIPTION SAMPLING FREQUENCY DESCRIPTION	POC	ROAD # / DISTANCE ROAD (M)	PROBE HT(M)	DATE SAMPLING BEGAN	EFFECTIVE APP DATE AS PAMS	SITE CRIT MET ACTION TYPE ACTION REASON
06-019-4001	(42600) REACTIVE OXIDES OF N	1	(1) 10	6	06/07/95	06/07/95	Y
9240 S. RIVERBEND, PARLIER 93648	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
PARLIER, CA							96
(3) MAX OZONE CONCENT	(42601) NITRIC OXIDE	1	(1) 10	6	01/01/94	06/07/95	Y
	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				
	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				96
							96
							APP
(1) SMITH, 000500 ADT	(42603) OXIDES OF NITROGEN	1	(1) 10	6	01/01/94	06/07/95	Y
(2) MANNING AVE., 013051 ADT	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
							96
	(43101) TOTAL HYDROCARBONS	1	(1) 10	6	06/07/95	06/07/95	Y
	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
							96
- - -	(61101) WIND SPEED	1	(1) 10	6	07/21/87	06/07/95	Y
9240 S. RIVERBEND, PARLIER 93648	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
PARLIER, CA							96
	(61102) WIND DIRECTION	1	(1) 10	6	07/21/87	06/07/95	Y
	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
							96
	(62101) OUTDOOR TEMPERATURE	1	(1) 10	6	06/07/95	06/07/95	Y
	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
							96
	(62201) RELATIVE HUMIDITY	1	(1) 10	6	06/07/95	06/07/95	Y
	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
9240 S. RIVERBEND, PARLIER 93648	(63301) SOLAR RADIATION	1	(1) 10	6	06/07/95	06/07/95	Y
PARLIER, CA	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
							96
	(63302) ULTRVIOLET RADIATION	1	(1) 10	6	06/07/95	06/07/95	Y
	DAILY: 24 - 1 HR SAMPLES -PAMS		(2) 800				APP
							96
	(64101) BAROMETRIC PRESSURE	1	(1) 10	6	06/07/95	06/07/95	Y

EPA REGION: 05 STATE (17): ILLINOIS
SITE ID: 17-031-0025 ADDRESS: KENWOOD HIGH SCHOOL 5015 S BLACKSTONE AV STATE/LOCAL ID:
CITY POPULATION : 3,005,072 CITY (14000): CHICAGO DIST CITY: K UTM ZONE : 16
AQCR POPULATION : 7,917,109 COUNTY (031): COOK CO DIFF GMT : 06 UTM NORTH: 4628086
DATE ESTABLISHED: / / ELEV MSL : 196 M UTM EAST : 450808
MET SITE: DATE TERMINATED : / / COMP SECT: LATITUDE : +41:48:18
SITE ID : - - DATE LAST UPDATE: 1997/05/05 LONGITUDE: -087:35:32
DISTANCE SITE : M HQ EVAL DATE : / /
DIRECTION SITE: REGN EVAL DATE : / /
TYPE SITE ( ):
AQCR (067): METROPOLITAN CHICAGO
CMSA LOCATED IN (0014): CHI-GARY-KENOSHA,IL-IN-WI
LAND USE (1): RESIDENTIAL
LOCATION SETTING (2): SUBURBAN
MSA LOCATED IN (1600): CHICAGO, IL
SITE COMMENT 1 : IEPA OPERATES OZONE MONITOR
SITE COMMENT 2 : TAMN SO2, WD, WS, COH, NO2, NO STARTED 12/71
URBAN AREA REPRESENTED (0000): NOT IN AN URBAN AREA

SITE ID: 17-031-0025

PARAMETER	: 42101	DATE SAMPLING BEGAN:	1978/01/01	SITE CRITERIA MET	:	DATE SITE CRITERIA MET:	/
POC	: 1	DATE SAMPLING ENDED:	1987/12/31	REF MTHOD USED	:	REF METHOD USED DATE :	/
MONITOR TYPE	: 0	DATE TYPE EFFECTIVE:	1978/01/01	QA PLAN	:	QA EFFECTIVE DATE :	89/10
REPORTING ORGANIZ	:	RO EFFECTIVE DATE :	/ /	ACTION TYPE	:	ACTION TYPE REASON :	
COLLECTING LAB	: 000	AUDIT DATE :	/ /	MONITOR OPEN PATH NUM	:	PROJECT CLASS :	01
ANALYZING LAB	: 000	PROBE LOCATION ( ):					
UNRESTRIC AIR FLOW:		PROBE HEIGHT :	16 M	HORIZONTAL DISTANCE	:	VERTICAL DISTANCE :	
MONITOR COMMENTS 1:	11						
PARAMETER	: 42401	DATE SAMPLING BEGAN:	1974/01/01	SITE CRITERIA MET	:	DATE SITE CRITERIA MET:	/
POC	: 1	DATE SAMPLING ENDED:	1980/12/31	REF MTHOD USED	:	REF METHOD USED DATE :	/
MONITOR TYPE	: 0	DATE TYPE EFFECTIVE:	1974/01/01	QA PLAN	:	QA EFFECTIVE DATE :	89/10
REPORTING ORGANIZ	:	RO EFFECTIVE DATE :	/ /	ACTION TYPE	:	ACTION TYPE REASON :	
COLLECTING LAB	: 000	AUDIT DATE :	/ /	MONITOR OPEN PATH NUM	:	PROJECT CLASS :	02
ANALYZING LAB	: 000	PROBE LOCATION ( ):					
UNRESTRIC AIR FLOW:		PROBE HEIGHT :	16 M	HORIZONTAL DISTANCE	:	VERTICAL DISTANCE :	
DOMINANT SOURCE	(1): POINT						
MONITOR COMMENTS 1:	13						
PARAMETER	: 42401	DATE SAMPLING BEGAN:	1975/01/01	SITE CRITERIA MET	:	DATE SITE CRITERIA MET:	/
POC	: 2	DATE SAMPLING ENDED:	1980/12/31	REF MTHOD USED	:	REF METHOD USED DATE :	/
MONITOR TYPE	: 0	DATE TYPE EFFECTIVE:	1975/01/01	QA PLAN	:	QA EFFECTIVE DATE :	89/10
REPORTING ORGANIZ	:	RO EFFECTIVE DATE :	/ /	ACTION TYPE	:	ACTION TYPE REASON :	
COLLECTING LAB	: 000	AUDIT DATE :	/ /	MONITOR OPEN PATH NUM	:	PROJECT CLASS :	02
ANALYZING LAB	: 000	PROBE LOCATION ( ):					
UNRESTRIC AIR FLOW:		PROBE HEIGHT :	16 M	HORIZONTAL DISTANCE	:	VERTICAL DISTANCE :	
DOMINANT SOURCE	(1): POINT						
MONITOR COMMENTS 1:	14						

AMP390 AIR QUALITY SUBSYSTEM

SITE MONITOR STATUS REPORT

CURRENT VALUES FOR SITE 17-031-0026 :

REGION: 05 STATE: ILLINOIS ADDRESS: CERMAK PMG STATION 735 W HARRISON DISTANCE CITY: 001 KM ELEVATION MSL: 180 M

COMPASS SECTOR SE LONGITUDE 87:38:42 W LATITUDE 41:52:24 N METHOD OF DET:

UTM ZONE 16 UTM EASTING 446469 UTM NORTHING 4635707 SCALE: EST OF ACC:

MSA: (1600) CHICAGO, IL AQCR: (067) METROPOLITAN CHICAGO CITY: (14000) CHICAGO

LAND USE: (7) MOBILE LOCATION-SETTING: (1) URBAN AND CENTE SUPPORT AGENCY: (001) ILLINOIS ENVIRONMENTAL PROTECT

HQ EVAL DATE: / / RG EVAL DATE: / /

PAMS INFORMATION:

TYPE PAMS SITE	(1) ()	(2) ()	(3) ()
MSA REP.	(0)	(0)	(0)
CMSA REP.	(0)	(0)	(0)

PAMS MET SITE TYPE:	MET AIRS ID:										
TANGENT STREET NUM	(1) 1	(2) 2	(3)		(4)		(5)		(6)		
STREET NAME	DAN RYAN	HARRISON									
TYPE ROAD	(2) EXPRESSWAY	(5) THRU ST OR									
TRAFFIC FLOW	261200	8600	0		0		0		0		
YR OF TRAF FLOW	1991	1979									
DIR TO STREET	E	N									
PARAMETER-POC	12136-1		12154-1				12164-1				
MONITOR TYPE-DATE	0 - 1986/01/01		3 - 1988/09/01				3 - 1990/01/05				
NON-ATTAINMENT AREA	-		-				-				
URBAN AREA REPRESENTED	(1601) CHICAGO, IL-NORTHWESTERN		(1601) CHICAGO, IL-NORTHWESTERN				(1601) CHICAGO, IL-NORTHWESTERN				
ACTION TAKEN											
ACTION REASON											
COLLECTING LAB	003 - COOK COUNTY DEPARTMENT OF		001 - ILLINOIS ENVIRONMENTAL PR				001 - ILLINOIS ENVIRONMENTAL PR				
ANALYZING LAB	003 - COOK COUNTY DEPARTMENT OF		001 - ILLINOIS ENVIRONMENTAL PR				001 - ILLINOIS ENVIRONMENTAL PR				
REPORT ORGANIZATION	003 - COOK COUNTY DEPARTMENT OF		001 - ILLINOIS ENVIRONMENTAL PR				001 - ILLINOIS ENVIRONMENTAL PR				
REPORT ORG DATE	1995/01/01		1988/09/01				1990/01/05				
DOMINANT SOURCE											
MEASUREMENT SCALE											
PROBE HEIGHT	8 METERS		0 METERS				5 METERS				
PROBE LOCATION											
HORIZONTAL DISTANCE	0 METERS		0 METERS				0 METERS				
VERTICAL DISTANCE	0 METERS		0 METERS				0 METERS				
SITING CRITERIA-DATE	- /		- /				- /				
REF METHOD-DATE	- /		- /				- /				
QA PLAN-DATE	- 89/10		- 89/10				- 89/10				
DATE SAMPLING BEGAN	1986/01/01		1988/09/01				1990/01/05				
DATE SAMPLING ENDED	/ /		/ /				/ /				
AUDIT DATE	/ /		/ /				/ /				
MONITORING OBJECTIVE			(1) MAXIMUM CONCENTRATION								
PAMS REQ SF											
UNRESTRICTED AIR FLOW											
TYPE OBSTRUCTION:	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)		
HEIGHT OBSTRUCTION:	0 M	0 M	0 M	0 M	0 M	0 M	0 M	0 M	0 M		
DISTANCE:	0 M	0 M	0 M	0 M	0 M	0 M	0 M	0 M	0 M		
DIRECTION:											
STREET NUMBER	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)		
DISTANCE ROAD	0 M	0 M	0 M	0 M	0 M	0 M	0 M	0 M	0 M		

- TSP RECORDS EXTRACTED: 0
PB RECORDS EXTRACTED: 0
CO RECORDS EXTRACTED: 0
SO2 RECORDS EXTRACTED: 0
NO2 RECORDS EXTRACTED: 0
O3 RECORDS EXTRACTED: 0
PM10 RECORDS EXTRACTED: 160
OTHER RECORDS EXTRACTED: 0

PM-10 TOTAL 0-10UM (81102) ALABAMA UNITS: 001 UG/CU METER (25 C)

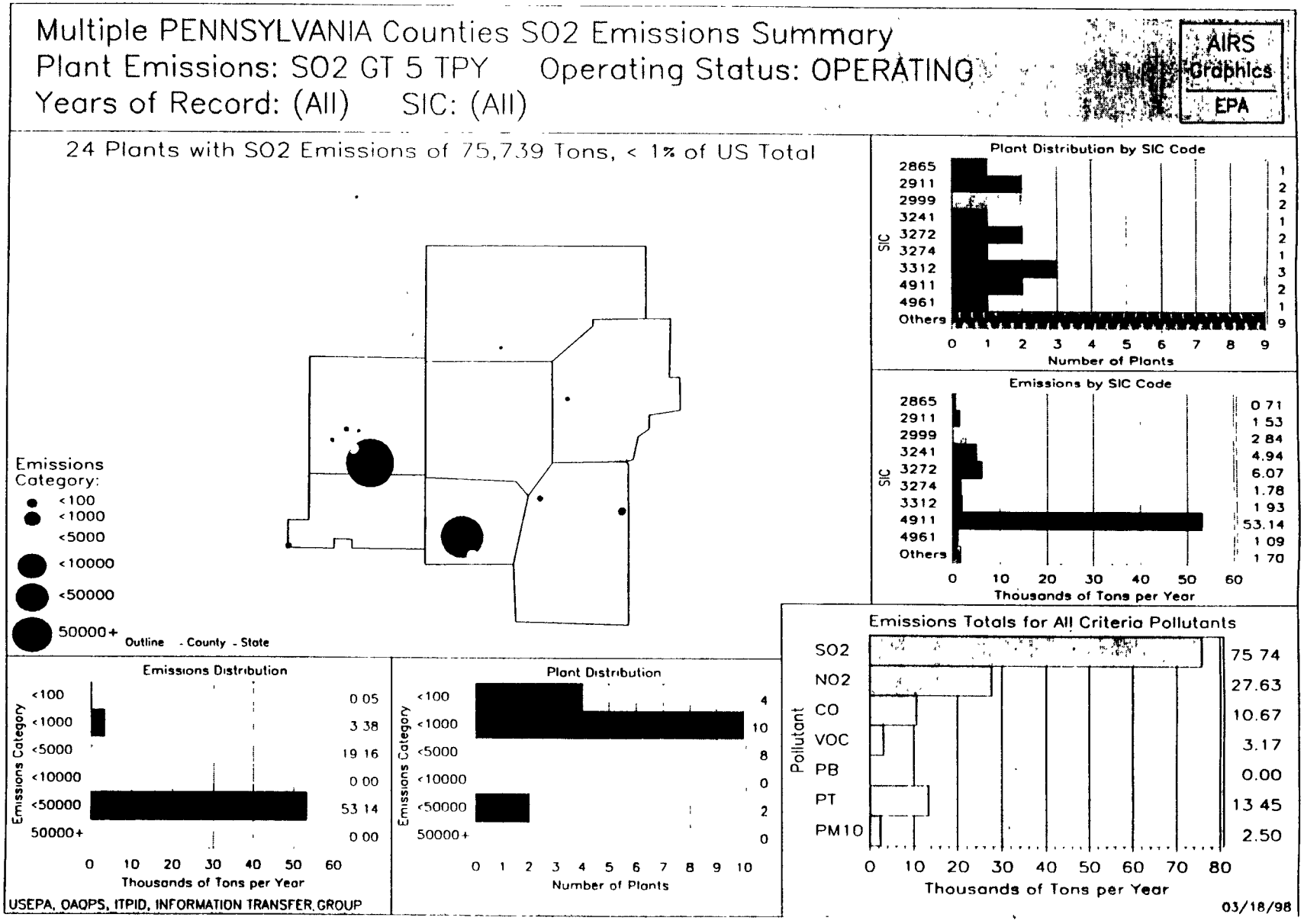
SITE ID	POC	MT	CITY	COUNTY	ADDRESS	YR	REP ORG	NUM OBS	SCHEDULED NUM OBS	% OBS	NUM REQ	MAXIMUM VALUES 1ST	2ND	3RD	4TH	VALS MEAS	> 150 EST	WTD ARITH MEAN	METH
01-015-0001	1	2	ANNISTON	CALHOUN CO	309 EAST 8TH STREET	94	011	56	56	89	63	46	44	43	42	0	0.00	24?	063
01-015-0001	1	2	ANNISTON	CALHOUN CO	309 EAST 8TH STREET	95	011	59	59	94	63	68	62	56	43	0	0.00	23	063
01-015-0001	1	2	ANNISTON	CALHOUN CO	309 EAST 8TH STREET	96	011	53	53	83	64	40	31	29	29	0	0.00	19?	063
01-015-0001	1	2	ANNISTON	CALHOUN CO	309 EAST 8TH STREET	97	011	57	57	90	63	51	49	47	47	0	0.00	23	063
01-033-1002	1	2	MUSCLE SHO	COLBERT CO	WILSON DAM RD AND 2ND	94	011	55	55	87	63	57	39	39	38	0	0.00	20?	063
01-033-1002	1	2	MUSCLE SHO	COLBERT CO	WILSON DAM RD AND 2ND	95	011	57	57	90	63	55	49	42	41	0	0.00	22	063
01-033-1002	1	2	MUSCLE SHO	COLBERT CO	WILSON DAM RD AND 2ND	96	011	54	54	84	64	48	46	32	31	0	0.00	18	063
01-033-1002	1	2	MUSCLE SHO	COLBERT CO	WILSON DAM RD AND 2ND	97	011	59	59	94	63	44	41	39	39	0	0.00	19	063
01-049-1002	1	2	FORT PAYNE	DE KALB CO	1500 WILLIAMS AVE. N.	94	011	53	53	84	63	50	45	38	37	0	0.00	25?	063
01-049-1002	1	2	FORT PAYNE	DE KALB CO	1500 WILLIAMS AVE. N.	95	011	52	51	81	63	71	68	49	48	0	0.00	26?	063
01-049-1002	1	2	FORT PAYNE	DE KALB CO	1500 WILLIAMS AVE. N.	96	011	44	44	69	64	50	45	42	39	0	0.00	21?	063
01-049-1002	1	2	FORT PAYNE	DE KALB CO	1500 WILLIAMS AVE. N.	97	011	52	52	83	63	51	49	49	47	0	0.00	23?	063
01-053-0002	1	2	BREWTON	ESCAMBIA C	BELLVILLE AVE.BREWTON	94	011	60	60	95	63	69	52	44	44	0	0.00	27	063
01-053-0002	1	2	BREWTON	ESCAMBIA C	BELLVILLE AVE.BREWTON	95	011	61	61	97	63	63	51	47	46	0	0.00	27	063
01-053-0002	1	2	BREWTON	ESCAMBIA C	BELLVILLE AVE.BREWTON	96	011	60	60	94	64	50	41	40	40	0	0.00	24	063
01-053-0002	1	2	BREWTON	ESCAMBIA C	BELLVILLE AVE.BREWTON	97	011	61	61	97	63	55	51	46	46	0	0.00	26	063
01-055-0008	3	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	94	011	59	59	94	63	73	57	50	49	0	0.00	31	063
01-055-0008	3	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	95	011	60	60	95	63	65	60	53	51	0	0.00	30	063
01-055-0008	3	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	96	011	59	59	92	64	55	47	43	42	0	0.00	23	063
01-055-0008	3	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	97	011	55	55	87	63	63	58	53	52	0	0.00	28	063
01-055-0008	4	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	94	011	52	52	83	63	69	51	50	48	0	0.00	29?	063
01-055-0008	4	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	95	011	48	48	76	63	72	63	46	45	0	0.00	29?	063
01-055-0008	4	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	96	011	49	49	77	64	57	50	45	40	0	0.00	24?	063
01-055-0008	4	2	GADSDEN	ETOWAH CO	3200 WALNUT ST	97	011	42	42	67	63	56	51	47	44	0	0.00	25?	063
01-059-0001	1	2	RUSSELLVIL	FRANKLIN C	NORTH ALABAMA HOSPITA	94	011	57	57	90	63	61	44	43	42	0	0.00	22	063
01-059-0001	1	2	RUSSELLVIL	FRANKLIN C	NORTH ALABAMA HOSPITA	95	011	60	60	95	63	57	45	43	42	0	0.00	23	063
01-059-0001	1	2	RUSSELLVIL	FRANKLIN C	NORTH ALABAMA HOSPITA	96	011	60	60	94	64	50	45	34	33	0	0.00	19	063
01-059-0001	1	2	RUSSELLVIL	FRANKLIN C	NORTH ALABAMA HOSPITA	97	011	61	61	97	63	49	43	41	40	0	0.00	21	063
01-069-0002	1	2	DOTHAN	HOUSTON CO	EAST HIGHLAND ST., BO	94	011	56	56	89	63	97	63	55	53	0	0.00	28	063

? INDICATES THAT THE MEAN DOES NOT SATISFY SUMMARY CRITERIA

APPENDIX B

COUNTY EMISSIONS SUMMARY MAPS

MAPS OF MONITORS AND EMISSION SOURCES


Multiple PENNSYLVANIA Counties SO2 Emissions Summary
Plant Emissions: SO2 GT 5 TPY Operating Status: OPERATING
Years of Record: (All) SIC: (All)
AIRS Graphics EPA
24 Plants with SO2 Emissions of 75,739 Tons, < 1% of US Total
Emissions Category:
<100
<1000
<5000
<10000
<50000
50000+
Outline - County - State
Plant Distribution by SIC Code
SIC
2865 1
2911 2
2999 2
3241 1
3272 2
3274 1
3312 3
4911 2
4961 1
Others 9
0 1 2 3 4 5 6 7 8 9
Number of Plants
Emissions by SIC Code
SIC
2865 0 71
2911 1 53
2999 2 84
3241 4.94
3272 6.07
3274 1.78
3312 1 93
4911 53.14
4961 1 09
Others 1 70
0 10 20 30 40 50 60
Thousands of Tons per Year
Emissions Distribution
Emissions Category
<100 0 05
<1000 3 38
<5000 19 16
<10000 0 00
<50000 53 14
50000+ 0 00
0 10 20 30 40 50 60
Thousands of Tons per Year
Plant Distribution
Emissions Category
<100 4
<1000 10
<5000 8
<10000 0
<50000 2
50000+ 0
0 1 2 3 4 5 6 7 8 9 10
Number of Plants
Emissions Totals for All Criteria Pollutants
Pollutant
SO2 75 74
NO2 27.63
CO 10.67
VOC 3.17
PB 0.00
PT 13 45
PM10 2.50
0 10 20 30 40 50 60 70 80
Thousands of Tons per Year
USEPA, OAQPS, ITPID, INFORMATION TRANSFER GROUP
03/18/98

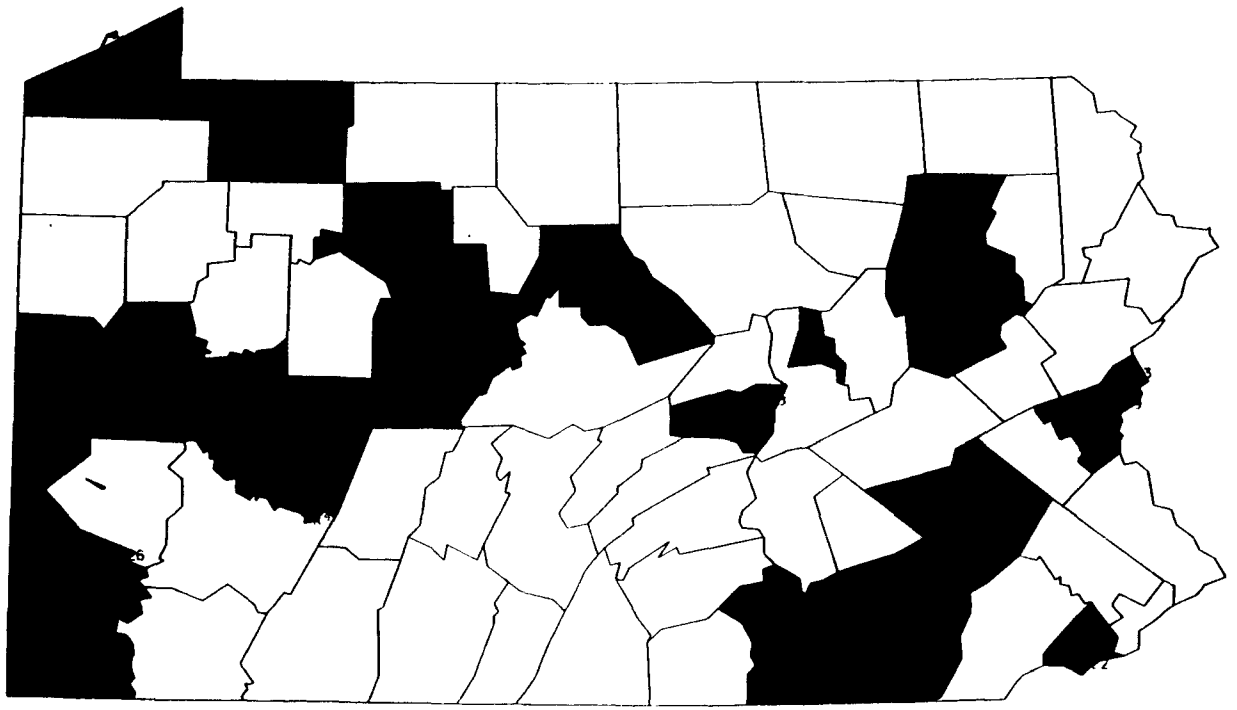
LARGEST SO2 EMISSION SOURCES IN PENNSYLVANIA

SIC: (All)

Year of Record: 1990 – 1995

Sources are located in shaded counties

AIRS Graphics
EPA



ESTIMATED ANNUAL EMISSIONS
THOUSANDS OF TONS (EMIS INV YEAR)

1	165	(95)	WEST PENN POWER/HATFIELD
2	145	(95)	PENELEC/KEYSTONE POWER PLT
3	127	(95)	GPU GEN CORP/HOMER CITY POW
4	112	(94)	PA P & L CO/MONTOUR SES
5	92 5	(94)	PA P & L CO/BRUNNER ISLAND
6	78.1	(95)	GPU GEN CORP/CONEMAUGH POW
7	58.4	(95)	PENELEC/SHAWVILLE GENERATIN
8	36.4	(94)	PA P & L CO/SUNBURY SES
9	24.4	(92)	PA P & L CO/MARTINS CREEK
10	22 8	(95)	PA POWER CO/NEW CASTLE
11	21.9	(95)	WEST PENN POWER/ARMSTRONG
12	19 6	(95)	PA POWER CO/BRUCE MANSFIELD
13	19 6	(93)	METRO EDISON CO/PORTLAND
14	15 0	(95)	GPU GEN CORP/SEWARD POWER
15	13 6	(95)	METRO EDISON CO/TITUS
16	11.4	(95)	PA P & L CO/HOLTWOOD
17	9 56	(95)	ZINC CORP AMER/MONACA SMELT
18	8.80	(94)	PH GLATFELTER CO/SPRING GRO
19	6 82	(95)	INTL PAPER CO
20	6.68	(95)	GE CO/ERIE PLT
21	6 56	(94)	PENELEC/WARREN
22	5 38	(95)	PECO ENERGY CO/EDDYSTONE
23	5.14	(95)	INTL PAPER CO/ERIE LAKEFRON
24	4.94	(95)	ARMSTRONG CEMENT & SUPPLY C
25	4 90	(93)	BETHLEHEM STEEL CORP/BETHLE
26	4 77	(94)	DUQUESNE LIGHT CO/ELRAMA
27	4 65	(93)	PROCTER & GAMBLE PAPER PROD
28	4.53	(95)	WILLAMETTE IND/JOHNSONBURG
29	4 16	(95)	UGI UTILITIES INC ELEC DIV/
30	3 73	(93)	ESSROC MATERIALS INC/NAZARE

USEPA, OAQPS, ITPID, INFORMATION TRANSFER GROUP

03/26/98

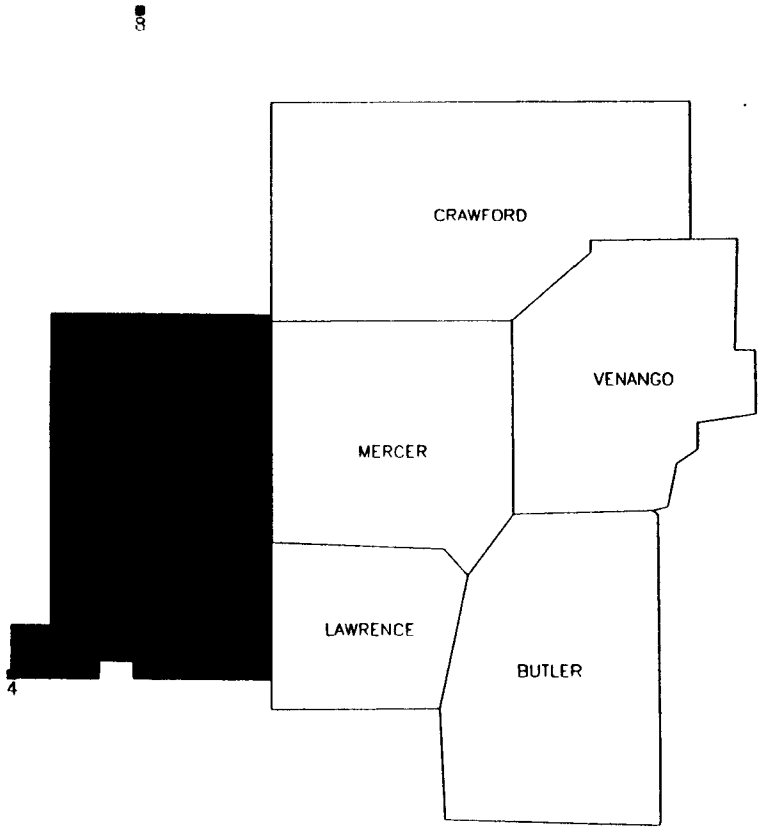
MULTIPLE COUNTIES IN OH, PA FACILITIES WITH SO2 EMISSIONS GT 5 TPY

OPERATING STATUS: OPERATING

YEAR OF RECORD: 1988 – 1993 SIC: (All)

AIRS Graphics EPA

Total emissions 34,162 tons (< 1 % of National SO2 emissions)



Facilities Ranked By Emissions

1 OHIO EDISON CO – NILES PLT
ID=39-155-5007 NILES, OH
30,322 TPY (1990) SIC=4911

2 W C I STEEL, INC.
ID=39-155-5042 WARREN, OH
1,626 TPY (1990) SIC=3312

3 YOUNGSTOWN THERMAL ENERGY CORPOR
ID=39-099-5014 YOUNGSTOWN, OH
1,093 TPY (1990) SIC=4961

4 WHITEACRE-GREER FIREPROOFING CO
ID=39-099-5001 ALLIANCE, OH
418 TPY (1990) SIC=3255

5 COPPERWELD STEEL COMPANY
ID=39-155-5010 WARREN, OH
279 TPY (1990) SIC=3312

6 DENMAN TIRE CORPORATION
ID=39-155-5001 BRACEVILLE TWP, OH
190 TPY (1990) SIC=3011

7 PACKARD ELECTRIC DIVISION
ID=39-155-5012 WARREN, OH
117 TPY (1990) SIC=3629

8 LTV STEEL CO
ID=39-155-5048 WARREN TWP, OH
108 TPY (1990) SIC=9999

9 YOUNGSTOWN WASTEWATER TREATMENT P
ID=39-099-5028 YOUNGSTOWN, OH
9 TPY (1990) SIC=4952

■ Merged Facility (9)
□ Non-merged Facility (0)

USEPA, OAQPS, ITPID, INFORMATION TRANSFER GROUP 03/26/98

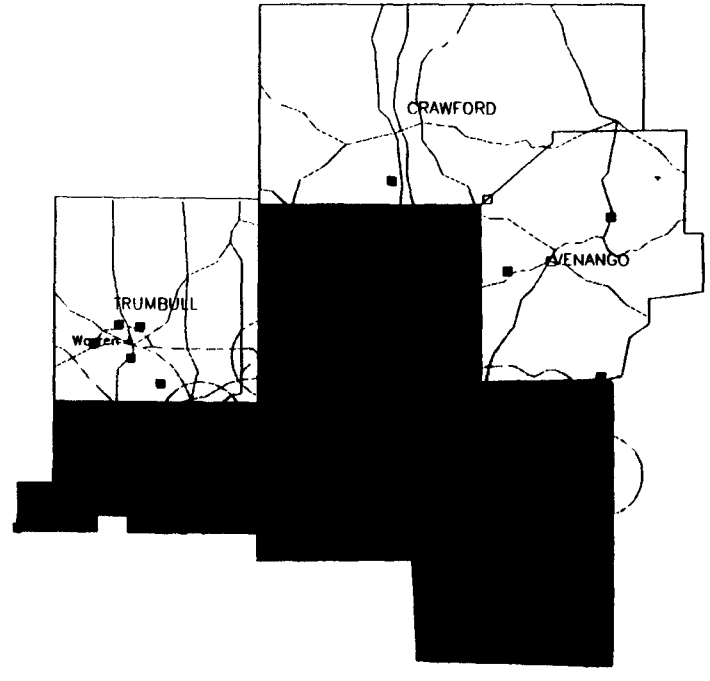
Plant/Monitor Locator for MULTIPLE COUNTIES IN OH, PA

Monitors for SO2 Active In 1994 (Based on Monitor Start–End Dates)

Plants With Emissions of SO2 above 25 Tons/Year, and Other Criteria Listed Below

AIRS Graphics EPA

Plant Operational Status: OPERATING, UNSPECIFIED
Shaded counties have monitors



Highway: — Interstate — US/State

Monitor Location: Circles, 5 mi. rad.

▲ (1) NAMS ▽ (3) SLAMS × (0) Other + (0) Unknown ■ Merged Facility (21)
★ (0) Industrial ○ (0) Tribal ◇ (0) Index Site ◆ (0) Non–EPA □ Non–merged Facility (2)
◀ (0) PAMS/VOC H (0) PAMS/NA ● (0) PAMS/SL ◁ (0) PAMS(pend)

USEPA, OAQPS, ITPID, INFORMATION TRANSFER GROUP

03/26/98

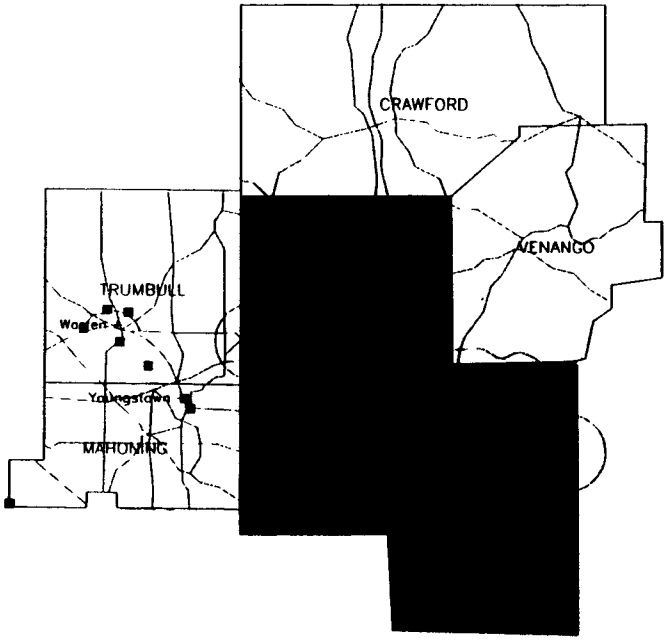
Plant/Monitor Locator for MULTIPLE COUNTIES IN OH, PA

Currently Active Monitors for SO2 (Based on Monitor Start-End Dates)

Plants With Emissions of SO2 above 5 Tons/Year, and Other Criteria Listed Below

AIRS Graphics EPA

Plant Operational Status: OPERATING
Latest Emissions Inventory: 1988-1993
Shaded counties have monitors



Highway: — Interstate — US/State

Monitor Location: ▽ (3) SLAMS × (0) Other ★ (0) Industrial ◇ (0) Index Site ■ Merged Facility (9)
Circles: 5 mi. rad □ Non-merged Facility (0)

USEPA, OAQPS, ITPID, INFORMATION TRANSFER GROUP 03/26/98

APPENDIX C

REENGINEERING AIR MONITORING NETWORKS

Reengineering Air Monitoring Networks

Phase I results - [Short-term measures which may be implemented immediately (FY-97), or shortly thereafter]:

Photochemical Assessment Monitoring Stations (PAMS)

Many commenters on the reengineering project noted that significant savings could be realized by reducing the sampling frequency for carbonyl compounds at the PAMS #2 Sites. For example, decreasing the carbonyl sampling frequency to four 3-hour samples every third day, retaining the year-round 24-hour sample, and adding a component to monitor on five peak ozone days plus each previous day, could save an agency as much as 60% on their carbonyl sampling alone. Additionally, reductions in VOC sampling at the PAMS #1, #3, and #4 canister Sites to a similar frequency, could save approximately 25% at each of those sites. To effect such changes, an agency would need to apply for a revision to its PAMS Network Plan; this request could minimally take the form of a letter proposing the adoption of these changes and specifying the particular 3-hour periods which would be monitored. It would be important, however, to maintain the same monitoring frequencies/periods at #1, #3 and #4 Sites in the same network and/or transport area. It also should be noted that there are some questions on the quality of carbonyl data. Efforts need to be extended to improve data quality.

For the FY-97 season, the following action is therefore recommended:

> Solicit PAMS plan amendment letters from the affected PAMS States and local agencies which reduce carbonyl sampling at PAMS #2 Sites; and, reduce VOC sampling at other PAMS Sites using canisters.

Criteria Pollutants

Most State and local agencies who commented on the reengineering straw man indicated that they had already conducted analyses to optimize their monitoring networks, eliminating unnecessary sites where possible and retaining sites necessary for their programs (e.g., assessing air quality violations, conducting trend analyses, addressing citizen complaints, and maintaining geographic coverage). Only those State and local agencies who have not completed this type of network modification will realize savings from implementing the straw man recommendations for their State and Local Air Monitoring Stations (SLAMS). The EPA would encourage any agency who has not conducted such network evaluation and modification to implement similar *optimization* measures.

Substantial decreases in ambient lead levels and reduced sulfur dioxide emissions are the basis for ongoing modifications to the monitoring regulations for lead (e.g., virtual elimination of mobile source oriented lead monitoring) and sulfur dioxide, respectively. These modifications are in varying stages of progress and have the potential to free resources for emerging monitoring needs. Similarly, very few violations of the nitrogen dioxide standard have been recorded. Combined with the fact that existing NAMS/SLAMS Nitrogen Oxides (NOx) instruments are biased high (i.e., they record values higher than true Nitrogen Dioxide (NO_2), it is reasonable to initiate reductions in NO_2 monitoring used for comparisons to the NAAQS (as opposed to PAMS locations where estimates of ozone precursors are desired). We do not feel that a rule change is needed for reducing NO_2 sites as the requirements are minimal, and some number of sites are needed for air quality trends and emissions

tracking. Accordingly, we still require retaining existing NAMS and PAMS NOx monitoring sites. Similarly, several CO sites have been recording very low values on a consistent basis. Although specific guidance is not yet available, we will be receptive to common sense case-by-case recommendations that are based on situations where measurements reflect high repetitions (i.e., several sites in a well-mixed air basin), low values, and /or low population densities. Our suggested targets in Table 1 assume that those sites consistently measuring less than 60% of the NAAQS would be removed.

Finally, the PM-10 monitoring efforts must be reduced (not eliminated) as greater emphasis (and resources) will be required for PM2.5 monitoring. A basic guideline for PM-10 is to retain all NAMS sites for long-term trends, and only those other sites that measure greater than 60% of the annual PM-10 standard to reach a national goal of roughly 494 NAMS/SLAMS PM-10 sites for 2000 and beyond. A similar approach could be used for special purpose PM-10 sites.

We recognize that our national goals do not fit precisely with the State by State plans, and many of our assumptions fall short in addressing local situations. Clearly, we need strong communications for us to collectively meet these National targets. Guidance for reconfiguring the networks is underway, and we will meet with Regional Office and State/local agencies to tailor modifications that balance the realities of State/local programs with a shift in National priorities. In addition, many commenters pointed out that we should not expect major resource savings from these criteria pollutant monitoring programs because several changes had been initiated by State and local agencies.

Rural PAMS, Reactive Oxides of Nitrogen (NOy), speciated PM-2.5 and data analysis

Nitrogen/NOy

The PAMS program produces a wealth of VOC measurements, but has only marginally improved our nitrogen (NOx, NOy) data base. Given the importance of NOx and NOy in detecting emissions trends for NOx control strategies and assisting the use of observational based models and other characterization methods, we suggested that improved nitrogen measurements be considered as part of our reengineering proposal. It remains our opinion that improved nitrogen measurements are a worthwhile enhancement to PAMS. However, we received very little feedback in this area. Our level of proactivity is dictated largely on your responses and needs. Consequently, without strong support from the user community, we can effect only minor changes. At this time, measurements of total reactive oxides of nitrogen (NOy) are encouraged at PAMS, but are not required. Conceivably, reduction in carbonyl and VOC sampling and analysis frequencies could free resources for NOy monitoring. However, implementing a new PM-2.5 monitoring network is the highest priority across monitoring programs. The EPA recognizes the limitation of many of the current NOx instruments as well as the value of NOy data. Nitrogen measurements clearly are valuable for emissions tracking and characterization analysis (e.g., observational modeling). The EPA will explore identifying grant support for NOy monitoring in future allocations of PAMS §105 grant monies.

Rural/background stations

Some comments were received regarding the need for the addition of "rural" monitoring sites. Given the resource load arising from implementing PM-2.5 monitoring, resources for additional PAMS rural sites are not

the highest priority. Nevertheless, revisions to PAMS network plans which optimize a cadre of urban and rural stations are encouraged.

Very good news is available as we understand that operation of several North American Research Strategy for Tropospheric Ozone (NARSTO) Northeast sites (which are rural complements to PAMS sites) will be assumed by government and private sector/academic groups. Following is a tentative listing of groups that may operate the NARSTO Northeast sites:

Narsto Northeast Site	Operator (tentative)
1. Kunkeltown, PA	Pennsylvania DEP
2. Holbrook, PA	Pennsylvania DEP
3. Truro, MA	Massachusetts DEP
4. Arendtsville, PA	Pennsylvania DEP/CASTNET
5. Brookhaven, NY	Brookhaven National Lab
6. Pinnacle Park, NY	SUNY/ESEERCO
7. Whiteface Mountain, NY	SUNY/ESEERCO
8. Loudonville, NY	SUNY/NYDEC/ESEERCO
9. Harvard Forest, MA	Harvard
10. Shenandoah N.P., VA	U of MD

Most of the surface level ambient monitoring for NOy, ozone and meteorology will be retained at the first six sites, which were new sites added as part of NARSTO-Northeast. The remaining sites had been in existence for other special study needs and were consolidated as part of the NARSTO-NE network; various monitoring approaches and special studies are likely to be conducted at sites 5-9. Varying levels of VOC monitoring are expected at most of the sites. Certain decisions regarding the operation of NARSTO-Northeast radar profilers are under discussion within the NARSTO Northeast organization. A great deal of appreciation should be expressed to NARSTO-Northeast, and particularly the utility industries which provided most of the capital costs for these monitoring platforms and the operation and funding for the field programs. At this time, these sites are not formally part of the PAMS network, an option that is available to States through revisions to PAMS network plans.

Discussions concerning management of the Clean Air Status and Trends Network (CASTNET) program probably will lead to a switch of oversight from Assistant Administrator for Research and Development (ORD) to Assistant Administrator for Air and Radiation (OAR). Regardless of what organization has oversight responsibility, the maintenance and integration of CASTNET as a more recognizable component of our national networks will strengthen not only our ability to assess the effectiveness of the acid precipitation control program, but also enhance the rural component of our networks. CASTNET will benefit many air programs, as measurements of ozone, speciated PM and visibility often are included at many sites. The combination of CASTNET and Interagency Monitoring of Protected Visual Environments (IMPROVE) networks provide broad coverage of several rural and remote regions.

In addition, EPA's National Air and Radiation Laboratory plans to develop a population based exposure network for monitoring radioactivity of atmospheric aerosols (i.e., as fallout material). Many similarities in instrumentation (filter based particle samplers) and network design exist between this program and the proposed PM-2.5 network, which has a strong population exposure orientation. Consequently, we are exploring ways by

which both of our programs may benefit from cost reductions (e.g., shared monitoring site locations platforms) and other common needs.

PAMS data analysis

Several commented on the importance of allotting sufficient resources for PAMS data analysis, reasoning that it is difficult to modify a network without appropriate levels of analysis to ascertain the strengths and weaknesses of the existing design. The PAMS data analysis is a high priority and has lagged behind implementation of the network. Since implementation is well underway, we expect a shift in emphasis toward analysis that will assist us in our ongoing network review. Currently, several PAMS analysis workshops are being conducted throughout the country. These workshops are designed to introduce analysis methods and assist the development of data analysis plans for various regions. We seek support from the Regional Offices, States and the research community in extracting value from this important data set. We believe the PAMS data has been virtually untapped, and that its importance will emerge clearly over time. Particularly important is your use of the data to relate ambient emissions to predicted emissions, and eventually to assess trends in emissions. The recent ability of the PAMS data in identifying significant reductions in benzene and other species illustrates the successful implementation of the reformulated fuel program.

More importantly, the most logical approach to redesigning a particular network involves analysis of existing data to determine the strengths, gaps and redundancies of a network. Such analyses are strongly encouraged, and should provide the basis for implementing intelligent reconfiguration actions.

Speciated PM-2.5

Our proposed regulations do not require speciated PM-2.5. However, we realize that chemically speciated PM-2.5 data is necessary to formulate credible control strategies and track the progress of implementation programs. We will provide guidance and resources for sampling and analysis for speciated PM-2.5.

Continuing reengineering objectives

As we close out this first phase of network reengineering, it has become apparent that constant evaluation of our monitoring networks must be imbedded in our thinking and actions. Several active organizational groups and partnerships are placing enormous demands on our monitoring networks. A partial list includes Ozone Transport and Assessment Group (OTAG), Federal Advisory Committee Act (FACA), and NARSTO; all multistakeholder groups which rely on relevant and high quality monitoring data. The expectations of monitoring networks are substantial, and we must be careful not to overstate the value of our programs. New demands placed on the monitoring program must be balanced by a continued commitment to the principal objectives of regulatory networks - *NAAQS compliance and population-oriented exposure monitoring*. While these objectives can provide a large degree of infrastructure for characterization purposes, by themselves the regulatory networks cannot be expected to fulfill all needs. Nevertheless, communication linkages across multiple stakeholder groups should improve network evaluation and optimization.

Research Community

The relationship to NARSTO-Northeast, as described above, has provided benefits by expanding PAMS compatible networks into rural locations and adding quality nitrogen measurements. The NARSTO national assessment will produce two especially relevant papers, one on monitoring methods and a second on networks. While these papers will take a highly critical look at our regulatory programs, the insight from and our participation in these efforts (expected in mid-1998) should provide valuable guidance commensurate with that provided by the 1991 National Academy of Sciences Report.

We should not overlook the very important contributions from the Southern Oxidant Study (SOS) community. Monitoring methods development (particularly NOy), observational analysis approaches and the importance of the rural component in the interacting spatial and temporal scales affecting air quality are a small sample of the SOS contributions that impact our work in a very direct way. To further strengthen the dialogue with the monitoring research community, Dr. James Price of the Texas Natural Resources Conservation Committee (TNRCC) will organize a workshop of experts in the Fall of 1997, after the PAMS data analysis workshops have been conducted. Our objective is to establish a more continuous and organized dialogue with the expert community to assist us in regular evaluation and improvement of our networks toward improved regulatory decisionmaking.

OTAG/FACA

While the analysis phase of OTAG is winding down during this transition period to decision making, the wide array of data analysis and model evaluation studies should serve as examples for continued analysis that is required for intelligent reengineering. Consistent with OTAG and the advice from the scientific community, the FACA activities demand a critical look at the monitoring networks ability to characterize air quality over broad and interacting spatial and temporal scales. In addition, FACA demands that we address the integration of networks across pollutant categories. While monitoring is germane to nearly every FACA topic, several specific FACA subtopic groups or issue papers address the role of monitoring, monitoring incentives, areas of violation (AOV), and monitoring State Implementation Plan System (SIPs).

State/Local agency/EPA activities

We will continue our communications with State/local agencies and regional EPA offices through State and Territorial Air Pollution Program Administrators (STAPPA)/ Association of Local Air Pollution Control Officials (ALAPCO), Standing Air Monitoring Work Group (SAMWG), and other meeting venues to solicit advice on monitoring networks. Several PAMS data analysis workshops for EPA regional office and State/local staff are scheduled for this spring and summer. The Winter Monitoring workshop for EPA Regional Offices in late February and the April SAMWG meeting in upstate New York focus on PM-2.5, reengineering, quality assurance and PAMS data analysis. Several recent and upcoming STAPPA/ALAPCO, (Mid-Atlantic Regional Air Management Association (MARAMA), Northeast States for Coordinated Air Use Management (NESCAUM) and Western States Air Resources Council (WESTAR) meetings have or will include monitoring topics as key agenda items. In addition, we will continue to explore partnerships with the private sector, and try to build on the successful NARSTO-Northeast program. High quality monitoring data benefits all stakeholders as it directly improves our basis for understanding and decision making. Such an advantage is well worth the costs attendant with data collection and analysis.

APPENDIX D

REFERENCE AND EQUIVALENT METHOD ANALYZERS

Carbon Monoxide Analyzers

Non-Specific Code	Description	Specific Code	Description
011	Non Dispersive Infra-Red	008	Non Dispersive Infra-Red Bendix 8501-5CA
		012	Non Dispersive Infra-Red Beckman 866
		018	Non Dispersive Infra-Red MSA 202S
		033	Non Dispersive Infra-Red Horiba AQM-10,11,12
		041	Non Dispersive Infra-Red Monitor Labs 8310
		048	Non Dispersive Infra-Red Horiba 300E/300SE
		050	Non Dispersive Infra-Red Mass CO-1
		051	Non Dispersive Infra-Red Dasibi 3003
		054	Non Dispersive Infra-Red Thermo Electron 48
		066	Non Dispersive Infra-Red Monitor Labs 8830
		067	Non Dispersive Infra-Red Dasibi 3008
		088	Non Dispersive Infra-Red Monitor Labs ML 9830
		093	Non Dispersive Infra-Red API Model 300 Gas Filter

NO_2 Analyzers

Non-Specific Code	Description	Specific Code	Description
011	Colorimetric	084 098	Sodium Arsenite Method TGS-ANSA Method
014	Chemiluminescence	021	Chemiluminescence Monitor Labs 8440E
		022	Chemiluminescence Bendix 8101-C
		025	Chemiluminescence CSI 1600
		031	Chemiluminescence Meloy NA530R
		034	Chemiluminescence Beckman 952A
		035	Chemiluminescence Thermo Electron 14B/E
		037	Chemiluminescence Thermo Electron 14D/E
		038	Chemiluminescence Bendix 8101-B
		040	Chemiluminescence Philips PW9762/02
		042	Chemiluminescence Monitor Labs 8840
		074	Chemiluminescence Thermo EI Model 42
		082	Chemiluminescence API Model 200
		083	Chemiluminescence Monitor Labs 8841
		089	Chemiluminescence Dasibi EC Model 2108
		090	Chemiluminescence Lear Siegler or Monitor Labs ML9841, 9841A
		104	Chemiluminescence Environment S.A. AC31M
		102	Open Path DOAS Opsis Model AR500

Ozone Analyzers

Non-Specific Code	Description	Specific Code	Description
011	Chemiluminescence	003	Chemiluminescence Meloy OA325-2R
		004	Chemiluminescence Meloy OA350-2R
		007	Chemiluminescence Bendix 8002
		016	Chemiluminescence McMillan 100-3
		017	Chemiluminescence Monitor Labs 8410E
		020	Chemiluminescence Beckman 950A
		023	Chemiluminescence Philips PW9771
		036	Chemiluminescence CSI 2000
		514	Chemiluminescence McMillan 1100-1
		515	Chemiluminescence McMillan 1100-2
014	Ultra Violet	019	Ultra Violet Dasibi 1003-AH,PC,RS
		047	Ultra Violet Thermo Electron 49
		053	Ultra Violet Monitor Labs 8810
		055	Ultra Violet PCI O3 Corp. LC-12
		056	Ultra Violet Dasibi 1008-AH
		078	Ultra Violet Environics Series 300
		087	Ultra Violet Model 400 O3 Analyzer
		091	Ultra Violet Monitor Labs 9810, 9811, 9812
--	--	103	Open Path DOAS Opsis Model AR500

SO_2 Analyzers

Non-Specific Code	Description	Specific Code	Description
014	Coulometric	010	Coulometric Philips PW9755
		511	Coulometric Philips PW9700
016	Flame Photometric	006	Flame Photometric Meloy SA185-2A
		030	Flame Photometric Bendix 8303
		032	Flame Photometric Meloy SA285E
		513	Flame Photometric Monitor Labs 8450
020	Pulsed Fluorescent	009	UV Fluorescent Thermo Electron 43
		060	UV Fluorescent Thermo Electron 43A or 43B
		077	UV Fluorescent API Model 100
022	Conductance Asarco	024	Conductance Asarco 500
023	UV Stimulated Fluorescence	029	UV Fluorescence Beckman 953
		039	UV Fluorescence Monitor Labs 8850
		046	UV Fluorescence Meloy SA700
		061	UV Fluorescence Dasibi 4108
		075	UV Fluorescence Monitor Labs 8850S
		077	UV Fluorescence API Model 100
		084	UV Fluorescence Environment S.A. AF21M
		092	UV Fluorescence Lear Siegler or Monitor Labs Model ML9850
		095	UV Fluorescence CSI Model 5700
		100	UV Fluorescence API Model 100A
--	--	101	Open Path DOAS Opsis Model AR 500